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## SUMMARY OF RECENT ABSTRACTS*

### IX. LEPROSY†

#### *General*

GRAMBERG (p. 132) points out that the word leprosy as used in the Bible was not meant to connote Hansen's disease, but was a translation of the Hebrew word which probably was used for many different conditions. The harsh treatment of " unclean " sufferers in Old Testament times, and the fears aroused by the Hebrew word, still continue to distort the general attitude and Gramberg pleads for a change of name, suggesting " leontiasis " which, as MacArthur explains in a scholarly comment on the whole subject, has been known in English for over 2 centuries.

The second report of the WHO Expert Committee on Leprosy is reviewed on p. 598; it covers many aspects of the leprosy problem, and should be read in full. A conference was held in Northern Nigeria in 1959, on the subject of tuberculosis and leprosy in West Africa (p. 375). The papers on leprosy related to epidemiology, rehabilitation, BCG, immunological relationships between tuberculosis and leprosy, and to the study of *Myco. leprae-murium in vivo*. Readers should refer to the original abstract of the Conference. SANSARRICQ and DUCASSE (p. 1268) give an account of a study tour of various countries in connexion with leprosy.

ALONSO (p. 377) discusses classification, preferring that adopted by the Madrid Congress rather than that proposed by the Indian Association of Leprologists.

#### *Distribution*

COCHRANE (p. 1175) gives an account of leprosy in England and Wales, where it is notifiable but where isolation is not compulsory; there are 2 leprosy hospitals. RUSCIANI (p. 709) in a general paper indicates that it is probably still a spreading disease in Calabria, Italy.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1960, v. 57. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on leprosy in this series, see the November issues of the *Tropical Diseases Bulletin* each year since 1939.

OUAZZANI (p. 39) describes the leprosy situation in Morocco, where the Berbers are more frequently infected than the Arabs and Jews, and where poor living conditions are factors. In Gambia MALLAC (p. 480) estimates the incidence of leprosy at 3·3%, with a slight (and unusual) preponderance in women. Lepromatous disease appears to be relatively rare, and disablement common; facilities for reconstructive surgery need to be improved. MERLE (pp. 480, 600) shows that in the Cameroons the incidence of leprosy varies from 0 to 4%, and familial infection is a factor in 45% of cases. Treatment is being given more and more by travelling assistants instead of at fixed institutions, and there are villages for the patients where they are voluntarily under control, and can be visited by doctors and assistants. These villages can be made to serve as models of sanitary methods. The emphasis is now on early and regular treatment.

In part of West Bengal GANGULY (p. 1175) found leprosy in 1·9% of men and 7·9% of women in 2 village groups. SHARMA (p. 134), in surveys of 2 subdivisions of Uttar Pradesh, found that in one the incidence of leprosy in children under 14 years old was relatively high, and the incidence of tuberculosis relatively low, in comparison with the other subdivisions, and he suggests, as others have done, that the two phenomena may be connected [see DE CAMPOS, below].

WORTH (p. 912) traces the history of leprosy in children born at the leprosarium at Kalaupapa in the Hawaiian Islands. When children were left with their parents the infection rate was 42%, but since 1929 the infants have been removed from the mothers at birth, and from Kalaupapa within the first few days of life, and no leprosy has been diagnosed in the 77 children born since that time.

In the Aichi Prefecture of Japan leprosy still occurs, but SOBUE (p. 710 *bis*) states that the incidence is declining; he gives details.

In an account of the mortality from leprosy in Antigua, West Indies, UTTLEY (p. 1176) shows that it has been steadily falling since about 1906. CARRANZA AMAYA (p. 134) notes that there are 41 foci of leprosy in the Republic of El Salvador, one Department showing an incidence of 59 per 100,000 population.

In discussing the control of leprosy by early diagnosis, mass treatment, health education and prevention of exposure, DINIZ and FONTE (p. 379) remark that in Brazil 62·8% of known patients are males, and that the disease becomes apparent under the age of 30 in 70%. DULCETTI (p. 42) remarks that the known incidence of leprosy in the State of Pará, Brazil, was 3·97 per 1,000 in 1957. In part of Brazil the incidence of tuberculosis is high where leprosy is low, and *vice versa*, and DE CAMPOS (p. 814) suggests [as others have done] that if this apparent antagonism is valid, the use of BCG should be advantageous.

MENEZES (pp. 817, 1269) gives an account of leprosy in a Brazilian town, where the highest incidence was in immigrants from nearby Uruguay, and discusses the incidence of leprosy in contacts in Uruguay, showing that it has been substantially less in contacts who have received BCG than in those who have not.

### *Transmission*

DUNGAL (p. 481) remarks that we do not yet know certainly how leprosy is spread, and an arthropod vector is a possibility; he thinks that *Sarcoptes scabiei*, fleas or lice may act in this way, and suggests a planned experiment to test the hypothesis.

### *Lepromin*

HANKS (p. 251) describes a technique for standardized counting of *Myco. leprae* in lepromin.

After histological examination of the sites of lepromin tests, AZULAY *et al.* (p. 1071) found that tuberculoid granuloma formation was a common feature in arrested lepromatous cases, and conclude that these findings are against Rotberg's view that lepromatous leprosy arises in anergic subjects because of their inability to produce the tuberculoid granuloma. BECHELLI *et al.* (p. 1271) studied the histological structure of the Mitsuda reaction, correlating it with the clinical reading. A negative histological picture in patients with a slight reaction indicates a relatively unfavourable course.

OLMOS CASTRO *et al.* (p. 137), after repeated injections of lepromin into healthy persons, conclude that the early (Fernandez) reaction indicates sensitivity to *Myco. leprae* and has the same value as the Mantoux reaction in tuberculosis, and that the late (Mitsuda) reaction is the final stage of the inflammation of the tuberculin type of hypersensitivity. He regards the early and late reactions as different stages of the same process, and hypersensitivity as different from immunity.

From an investigation of the effect of repeated testing with lepromin BECHELLI (p. 482) concludes that lepromin acts as a sensitizer, in an organism that will answer in a positive or a negative way according to its capacity for defence; sensitization may take a longer or a shorter time, and may not occur. He does not know whether lepromin can increase resistance, and further research is necessary on this point. AZULAY and NEVES (p. 1183) made repeated lepromin tests on guineapigs, and 1 of 15 gave a positive reaction, which indicates that sensitization is possible in this way.

MCFADZEAN (p. 1071) failed to alter a positive lepromin reaction by desensitizing patients (positive to both lepromin and tuberculin) with increasing doses of tuberculin.

FIGUEREDO and MARTINS (p. 377) trace the evolution of leprosy in 3 phases —pre-sensitized, sensitized and desensitized (lepromatous)—and they conclude that the lepromin reaction indicates sensitivity to the bacillus, and not resistance. In comment Muir suggests that this theory, which is supported by much detailed study, is worthy of careful consideration.

Dogs react to injection of lepromin in a manner similar to that of susceptible human beings; OLMOS CASTRO *et al.* (p. 43) show that this reaction can be suppressed by injections of prednisolone, but occurs when the prednisolone is stopped.

In tuberculoid and indeterminate forms of leprosy a negative Mitsuda reaction is an indication that treatment must not be stopped; for lepromatous leprosy MONTESTRUC (p. 816) considers that if other indications are satisfactory, treatment may be interrupted if the test becomes positive.

SILVA *et al.* (p. 377) found that injection of a polysaccharide fraction of BCG into lepromatous patients produced a tuberculin type of reaction, but phospholipid and wax fractions did not, though they produced positive reactions in some lepromin-positive subjects. Because the phospholipid and wax fractions do not produce reactions in lepromin-negative subjects, they may be useful as a base for an artificial lepromin.

*Bacteriology : Pathology*

LEW and CHUNG (p 712) report that by treating leprous tissue with trypsin, centrifuging and examining the stained deposit, considerably more bacilli may be found than with other processes. By this method almost all the débris is removed but acid-fastness is not lost. It is a simple technique.

SHEPARD (p. 1269) concentrated leprosy bacilli from nasal washings and inoculated them into mice, but did not obtain proof of multiplication of the organisms.

It has formerly been stated that living tubercle bacilli stained with acridine orange fluoresce green under ultra-violet light, whereas dead bacilli fluoresce red; MCFADZEAN and VALENTINE (p. 141) show that for *Myco. leprae-murium* this does not hold unless the bacilli have been killed by heat. They (p. 481) report on electron microscopic appearances of *Myco. leprae*, which may be useful in differentiating living from dead bacilli. MALFATTI (p. 711) discusses the granulations which appear in leprosy bacilli, and their appearance in the electron microscope.

GHOSH *et al.* (p. 1176) exposed excised lepromatous tissue repeatedly to X-rays ; the appearance of the leprosy bacilli was apparently not affected.

DE SOUZA *et al.* (p. 1270) describe an attempt to cultivate malignant tissue from a patient with leprosy, and they think that this type of cell may provide the material of choice for cultivating the bacilli.

DE SOUZA-ARAUJO (p. 1271) reports that he has transmitted *Myco. leprae* to black mice, producing nodules from which he obtained material which, on inoculation into leprosy patients, acted as an antigen giving results similar to those obtained in the classical Mitsuda test.

From examination of material from treated and untreated lepromatous subjects RIDLEY (p. 1176) concludes that the tissue reaction to *Myco. leprae* is quite passive and the reticulo-endothelial system is the principal site of destruction of the bacterial bodies. Under chemotherapy the bacilli generally disappear from the RES before they do from the skin, nerve or testis. Giant cells of 2 types may be found in leprosy, the Langhans type in tuberculoid, and the foreign-body type in lepromatous leprosy; they are discussed by ISHIHARA (p. 135).

VINGIANI (p. 1177) describes certain unusual histological findings in the skin in leprosy, for details of which the original abstract should be consulted. BRIEGER and CRAWFORD (p. 135) describe the fine structure of lepra cells, some details of which are given in the original abstract, and IMAEDA (p. 1070) discusses the formation and composition of components of lepra cells, as seen on electron microscopy.

BROWN and REES (p. 134) describe a simple apparatus for the transport of leprosy tissues on ice. Details are given in the abstract.

BONATTI and LEBRÓN (p. 136) found by electrophoresis that in lepromatous (but not tuberculoid) leprosy there is a marked increase in serum gamma globulin.

JARDIN and BEYTOUT (p. 600) found no increase in total serum proteins in tuberculoid leprosy in Sudanese subjects, but in lepromatous disease there was an increase in gamma globulin relative to total protein but not relative to the other globulins. They note, however, that alterations in the different fractions may be the result of other infections, which are common. COURMES and BENTZ

(p. 913) report investigations on serum proteins; thymol turbidity was high in lepromatous disease, and gamma globulins were raised.

C-reactive protein in human serum is a non-specific indicator of an inflammatory reaction; Ross *et al.* (p. 135) found it consistently in about one-fifth of a series of leprosy patients, and they think that failure to develop it in active lepromatous cases may have favourable prognostic significance. Montestruc (p. 482) found C-reactive protein in the serum of most patients with lepromatous leprosy or in tuberculoid patients in the stage of lepra reaction. It diminished under hormone treatment and its disappearance was a favourable sign, correlated with erythrocyte sedimentation test. C-reactive protein in serum is an indication of an inflammatory state; Languillon *et al.* (p. 1072) found it in a proportion of patients with lepromatous leprosy (especially in reaction), and in fewer with tuberculoid; the content diminishes as the reaction improves, and if it remains high a relapse may be expected.

Mayama (p. 1272) reports immunological studies on serum lipoprotein fractions isolated from leprosy patients; results should be sought in the original abstract.

Cardchol is a mixture of cardiolipin and cholesterol, and does not contain lecithin; Schmidt (p. 39) shows that with this antigen sera of leprosy patients give many more false positive reactions for syphilis than with normal cardiolipin antigen. Cardchol may be useful in distinguishing false positive sera due to leprosy. Ma *et al.* (p. 913) found that 5·9% of 1,016 leprosy patients gave false-positive tests for syphilis and that these were especially common in lepromatous leprosy.

After investigation of leprosy patients by the globulin titration technique Weiss and Fusillo (p. 1071) could not find any evidence of relationship between the antigenic mosaic of *Myco. leprae* and that of *Myco. tuberculosis.*

### *Clinical Findings*

Baruffa (p. 133) describes leprosy patients at a leprosarium in Somalia. Pennec and Sautet (p. 600) give a detailed account of leprosy patients in a segregation island and a hospital in Guadeloupe.

In an endemic area Chaudhuri *et al.* (p. 1178) made a study of premonitory symptoms in patients who subsequently developed leprosy. They mention pain, burning sensation, weakness in the limbs, loss of weight and anaemia, repeated traumatic lesions, eczema of long duration, and epistaxis.

Browne (p. 40) draws attention to the close clinical resemblance between leprosy and onchocerciasis, which in the Congo has led to much difficulty in differential diagnosis. In all doubtful cases in endemic areas it is necessary to examine smears for microfilariae and *Myco. leprae,* and sometimes to examine biopsy material histologically. He (p. 138) describes the clinical course of dimorphous macular leprosy in the Congo (where the general incidence of leprosy is high). The dimorphous macular form was found in 3·2% of the patients, and the fact that such patients are bacteriologically positive (skin and nasal mucosa) is easily missed because the clinical appearances may resemble those of tuberculoid leprosy. Periodical examination of skin and nasal smears should therefore be made. Alonso and Azulay (p. 483) comment on the rarity of borderline (dimorphous) leprosy in Rio de Janeiro, and describe a few cases. Bacilli were usually found and the lepromin reaction (in a series reported

by other authors) was more often negative than positive. The prognosis is good.

GOKHALE *et al.* (p. 140) investigated the circulation in the feet of leprosy patients with and without ulcers; differences in temperature were noted before and after spinal anaesthesia, but these differences were less in feet with ulcers than in feet without ulcers. The authors discuss possible implications. Leprosy patients are liable to develop blisters due to burns, and this is generally supposed to be due to lack of sensation and therefore to lack of warning; CHATTERJEE (p. 713), however, has measured the temperature of anaesthetic skin before and after the application of heat, and finds a greater variation than in normal skin, which may be due to reduced activity of the blood supply, and this may explain the liability to blistering.

Gynaecomastia is common in leprosy, and ROLLIER and REBOUL (p. 484) discuss the causation; it may possibly be due to functional changes in the testicles resulting in hypogonadism. After an investigation in leprosy patients ARCURI *et al.* (p. 138) conclude that the disease does not cause specific cardiological changes.

FURTADO (p. 138) reports the first case of the Lucio ("diffuse lepromatosis with multiple necrotizing vascularitis") form of leprosy to be recorded in Brazil. JOB and GAULT (p. 483) discuss the condition commonly known as lazarine leprosy, which they prefer to call the bullous reaction in leprosy. It is characterized by deep ulceration extending to muscles and tendons, and in a case described there was narrowing of the lumina of the vessels and thrombosis. This form is not confined to Mexico and South America, as was thought.

LANGUILLON and BOISSAN (p. 139) report an X-ray study of the bone lesions of the hands due to leprosy.

### *Treatment of Lepra Reaction*

SILVA and TUMA (p. 40) studied the corticosteroid hormones in relation to the lepra reaction; some details are given which indicate further investigation. TERENCIO and TARABINI CASTELLANI (p. 815) write favourably of dexamethasone (Millicorten, Ciba) in lepra reaction.

Antimalarial drugs, like corticosteroids, have been found useful in lupus erythematosus and rheumatoid arthritis, and JOB (p. 1178) therefore thought that they might be useful in controlling lepra reaction. He tried chloroquine, and the results compared favourably with those given by antimony and mercurochrome, and there was the additional advantage that the patients need not be confined to hospital. RAMU (p. 40) also finds chloroquine diphosphate useful, the dose being 0·25 gm. thrice daily for the first week and then twice daily for 2 weeks, and RAMANUJAM (p. 1273) also writes in a similar strain.

### *Treatment*

DOULL (p. 1072) discusses the whole subject of treatment of leprosy, including the complications.

BROWN (p. 486) discusses mass campaigns, which are now possible, and their limitations—for instance the treatment of the individual patient may become superficial and erratic. Treatment must take a long time, and the patient must feel and look better, and be accepted by society as being better. In Uganda where the people are scattered and do not live in villages, the leprosy organization consists of several leprosaria which act as consulting hospitals, and a large

number of treatment villages, each with its own out-patient clinic; BROWN (p. 1076) shows that there are now very few parts of the country where patients are without accommodation and treatment, and patients usually do not have to travel long distances to obtain it. Reviewing the leprosy campaign in part of the Congo during the past few years HAUZEUR (p. 1181) concludes that the mass treatment practised has led to a very definite decrease in incidence; intradermal BCG is not thought to have had much influence, and is not worth giving.

In a comparison of oral DDS with 3 preparations of DDS (or a modified form) given by intramuscular injection, CURRIE (p. 140) concluded that an aqueous suspension was the preparation of choice, to be given by intramuscular injection every 2 weeks. An effective blood level is maintained, but the level is high for the first 3 days after injection, and this is apparently favourable. LANGUILLON and CLARY (p. 485) have used a combination of 0·6 gm. DDS and 0·6 gm. thiacetazone, in 6 cc. of an equal mixture of chaulmoogra oil and esters, with guaiacol to 4%, for injection twice each month in leprosy of various kinds. The results were good but the treatment was expensive and should only be used when DDS is not well tolerated, or is without effect, or when reactions are severe.

ROLLIER (p. 714) reports favourably on the treatment of leprosy with DDS and tablets of sarsaparilla; he considers this to be the best treatment at the present time, and quotes results showing that nasal smears tended to become negative more rapidly than with DDS treatment alone.

CHAUSSINAND and BOURCART (p. 1274) report a patient who relapsed after treatment with a sulphone (J.51) which is equivalent to only one-quarter of the amount of DDS; they emphasize the danger of insufficient dosage.

From a consideration of leprosy patients (with all forms of the disease) before and after treatment with sulphones, LANGUILLON and BOISSAN (p. 1274) conclude that this treatment does not stop the evolution of pre-existing bone lesions. In comment Muir remarks that nothing is said about precautions against pressure, burning or other injuries, or about methods of restoring mobility and function.

BROWNE (p. 378) describes hyperpigmentation due to melanin in African patients undergoing treatment with sulphones for leprosy; the form of leprosy was immaterial and there was no relationship between the sites of leprosy lesions and the hyperpigmented macules. Electrocardiographic studies by LOGUINOV and EFIMOV (p. 913) showed abnormalities in 22 of 47 leprosy patients treated with sulphones, and the authors attribute these to the sulphones and think that drugs to counteract this action should be included in the complex of methods used in treating leprosy.

DAVEY (p. 1074) gives a full account of his experience in the treatment of leprosy in Nigeria, beginning with a discussion of the value of the morphological appearance of the bacilli as an indication of the action of drugs. Diphenylthiourea (Ciba 1906) was useful for up to the 36th month, after which the results were less good than with DDS, and it is therefore necessary to use DDS together with diphenylthiourea. Etisul for 8–12 weeks, followed by DDS, gives better results that DDS alone, but the author acknowledges that none of these drugs is ideal. The comments of speakers in the discussion on this paper are recorded in the original abstract. GARROD (p. 140) writes favourably of diphenylthiourea; results are almost comparable with those obtained with DDS, and lepra reactions and toxic effects are less common. It does not replace DDS as the drug of choice for mass treatment, but is of particular value when

DDS is not well tolerated. MONTESTRUC and BENOIST (p. 1076) also consider diphenylthiourea suitable for patients who do not respond satisfactorily to DDS. LANGUILLON *et al.* (p. 41) also write favourably of this compound in the treatment of lepromatous and tuberculoid leprosy; it gives results comparable with those given by DDS, it is free from side effects, but there have been reports of drug resistance. It should be reserved for use in cases of intolerance to DDS.

A relatively cheap thiourea (Dialide) was used by LE KHAC QUYEN *et al.* (p. 1180); results were generally good, but in some cases bacilli tended to reappear.

LECHAT (p. 816) used Etisul in African patients, with and without DDS, and reports considerable success; patients anointed each other 2 or 3 times each week, and remained enthusiastic—the smell was not found to be an impediment.

Bacilli stained in sections of tissue from patients treated with Etisul tended to fade within 24 hours; this did not occur with bacilli from patients treated with other substances. The phenomenon is not understood, and RHODES-JONES (p. 1180) is continuing to investigate it.

ALONSO (p. 714) writes favourably of thiacetazone in leprosy; it is better tolerated than the sulphones, and "should not be relegated to a place of secondary importance". A degree of improvement was observed by CONTRERAS *et al.* (p. 251) after using Dipasic (a combination of PAS and isoniazid) in lepromatous leprosy, and they conclude that this substance has a value in combination with sulphones or in patients refractory to sulphones. MONTESTRUC (p. 252) has also tried a combination of PAS and isoniazid (Pasiniazid), alternated with DDS; the results in lepromatous leprosy were no better than with DDS alone, but in tuberculoid leprosy improvement took place earlier. DOULL *et al.* (p. 1073) used a combination of pyrazinamide and isoniazid in lepromatous leprosy; the results were less favourable than those achieved with DDS in a control group.

LANGUILLON and CLARY (p. 41) have used D-cycloserine with success in 1 tuberculoid and a few lepromatous patients. DOULL *et al.* (p. 1073) found it less useful than DDS in lepromatous leprosy. It is useful, however, especially when given in conjunction with DDS, and ROLLIER and REBOUL (p. 714) advise that it should be used only when there is intolerance to DDS, or with other drugs to avoid resistance.

MUKERJEE *et al.* (p. 1179) did not observe any benefit from irradiation of lepromatous nodules on one side of the body, compared with control, unirradiated, similar nodules on the other.

DOULL (p. 486) reports that in the Ryukyu Islands one-third of the leprosy patients had moderate or severe disablement, and quotes other workers to the effect that much can be done by surgery and physiotherapy to prevent and remedy this disablement. PRICE (p. 1179) discusses the management of plantar ulcers in leprosy. Regular examination of patients' feet is important, and after infection and oedema have been controlled a walking plaster encourages healing; plastic surgery may be necessary. Rigid footwear is indicated for both threatened and healed plantar ulceration. He (p. 139) remarks that these ulcers will heal if the walking roll is interrupted either by bed rest, or by wearing a plaster cast or footwear with a rigid sole. He (p. 1273) discusses complications which may occur with plantar ulcers—infection, thrombosis, oedema, Charcot's joint, and complications resulting from metatarsectomy, which is an operation to be avoided.

BROWNE (p. 42) outlines a treatment for persistent perforating ulcers; some details are given in the original abstract. EKAMBARAM and SHARMA (p. 485) treat plantar trophic ulcers with dressings of Novolep, a by-product of the manufacture of DDS. Results are better than with other applications. IYENGAR (p. 1180) writes favourably of chloramphenicol cream as an application for trophic ulcers which had resisted other treatments.

LANGUILLON *et al.* (p. 815) report a detailed study of perforating ulcers in leprosy, and their treatment. The original abstract of this long paper can hardly be condensed further, and the paper should be read in full.

### *Control*

DINIZ (pp. 42, 1182) has published a long comprehensive account of leprosy in Brazil, and especially of the organization developed to control it. Control depends on sulphone treatment, supervision of contacts, and education.

For several years there has been an extensive programme of immunization with BCG in Martinique, partly aimed at reducing the incidence of leprosy, and MONTESTRUC *et al.* (p. 141) show that a significant reduction has in fact taken place. SILVA and NETO (p. 817) gave BCG by mouth to lepromin-negative child contacts of leprosy patients, but as the lepromin reaction afterwards varied from negative to different degrees of positivity the authors conclude that there are serious restrictions to the value of BCG, thus administered, as a prophylactic. MORENO (p. 1272) vaccinated Mitsuda-negative children of leprosy patients with BCG, and found that 36–40% became Mitsuda-positive. In children with weakly positive reactions the BCG produced conversion to stronger reactions.

From tests carried out on leprosy patients and on non-leprous children in Uganda BROWN (p. 136) concludes that when the multi-puncture depot test is used, antigens which do not contain leprosy bacilli (such as those prepared from normal skin, bacteriologically negative skin from leprosy patients, or lepromin) do not give positive results such as are given when the antigens are injected. BCG given subsequently has no effect on any of the depots except those containing lepromin, but after BCG all the subjects who were lepromin negative became positive, and most of those who were positive became more so. The bacilli appear to be the important factor and BCG vaccination quickly alters the attitude of the host to them. BROWN and STONE (p. 1177), using the multi-puncture depot lepromin test, found that positive results were considerably more common in children who had previously been given BCG than in those who had not, and they therefore support the administration of BCG.

MCFADZEAN and SINGH (p. 1181) have given BCG to tuberculin-negative persons on a small island off Malaya where leprosy is fairly common. Conversion rates were low—79% and 63%—with two batches of vaccine. The people are to be examined for leprosy during the next 10 years; there are adequate unvaccinated controls.

### *Rat Leprosy*

From observations on *Myco. leprae-murium* in a culture medium (which is defined) HART and VALENTINE (p. 601) conclude that especially in the presence of glucose or sucrose a true increase took place in bacterial protoplasm. The organisms, however, failed to divide and therefore to multiply. REES *et al.* (p. 1275) confirm previous work which showed that *Myco. leprae-murium* kept

in suspension at 37°C. tends to lose its morphological structure, and with it its infectivity. Change also occurred in bacilli in mice after treatment with isoniazid. Similar changes may be found in the bacilli of human leprosy, and probably indicate that the bacilli are dead. This may be a method of estimating the proportion of dead bacilli by light microscopy after staining by the Ziehl-Neelsen method. MUROHASHI (p. 603) argues that staining with malachite green and fuchsin can differentiate between living and dead *Myco. leprae-murium*, and in this way is useful in estimating the effect of kanamycin in murine leprosy; it appears to have some therapeutic value. OKADA (p. 43) gives an account of electron-microscope studies of the rat leprosy bacillus.

ITO and SONODA (p. 715) give an account of work done on the respiration and the enzyme activity of *Myco. leprae-murium*.

KATO and GOZSY (p. 817) measured the reticulo-endothelial response of rats infected with *Myco. leprae-murium*, by noting the clearance of injected carbon from the circulation, and by using other tests. They report fluctuation in capillary response during the infection. Details should be sought in the original.

In leprous mice investigated by SUSHIDA and HIRANO (p. 602) serum proteins showed an increase in alpha and beta globulins, but not in gamma globulin; other findings are also recorded.

TANIMURA *et al.* (p. 602) discuss screening tests for drugs for leprosy, in which mice infected with *Myco. leprae-murium* are used, and they recommend that the drugs to be tested should be given 6 times each week, starting with low doses, the effects to be measured by the size of the leproma produced by the infection. In comment Bushby suggests that this may not always be the most satisfactory method of estimating value.

MAURI (p. 818) used streptomycin with DDS in the treatment of rat leprosy; it was an improvement on DDS alone. FEGELER (p. 915) shows that kanamycin has a beneficial effect.

By intracorneal challenge with *Myco. leprae-murium* ROBSON and SMITH (p. 716) show that previous vaccination intradermally with that organism or with BCG produced (in comparison with controls) a reduction in the multiplication of the challenge bacilli, though the macroscopic lesion was not influenced. They suggest explanations for the latter phenomenon.

HADLER (p. 914) discusses the action of electro-negative particles (carbon, etc.) in the inoculum of heat-killed *Myco. leprae* and *Myco. leprae-murium*, on the inflammatory reaction produced in laboratory animals.

One rat of a group inoculated with *Myco. leprae* from man developed a heavy infection, but this was proved to be an infection with *Myco. leprae-murium*; MUKERJEE and KUNDU (p. 715) emphasize the importance of excluding the chance of infection of this kind, especially in laboratories where work is done on both human and murine leprosy bacilli.

DE SOUZA-ARAUJO (p. 1276) cultivated a white and a yellow strain of acid-fast bacilli from material from a rat leproma which, after mixing with isoniazid, had been inoculated into rats and mice. *Charles Wilcocks*

## MALARIA

*In this section abstracts are arranged as far as possible in the following order:*—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

CORNEJO DONAYRE, A. Investigaciones sobre pludismo en el Departamento de Madre de Dios. [**Malaria Survey in the Department of Madre de Dios, Peru**] Reprinted from *An. Facul. de Med.* Lima. 1960, Dec., v. 43, No. 4, 665–88, 12 figs. & 1 map on 4 pls. English summary.

No full malaria surveys have hitherto been undertaken in the Tahuamanu province in the northern part of the department of Madre de Dios, and the only data from the southern province of Tambopata relate to the finding of a few positive blood films in Puerto Maldonado (the capital), La Cachuela and Chonta.

In this thesis for a doctorate in the medical faculty of Lima, the author describes very fully, with tables, photographs and a map, a survey made in August 1957 and follow-up studies of parasite rates in March and June 1958. Throughout the period blood films from 899 persons were examined and only 19 were positive: almost equal numbers of the 3 principal species of *Plasmodium* were found. 13 of the positive findings were from Iberia in Tahuamanu, 5 from Puerto Maldonado and 1 from the Tahuamanu river area.

No anophelines were discovered in Puerto Maldonado and its vicinity, but in rural Iberia many breeding places of *Anopheles triannulatus* were found near houses, though few adults were seen resting in the houses. These mosquitoes are extradomiciliary, with outdoor biting habits, and the low endemicity of malaria in the department of Madre de Dios is attributed to the fact that *A. triannulatus* is a poor vector. *H. J. O'D. Burke-Gaffney*

GILLIES, M. T. **Studies on the Dispersion and Survival of *Anopheles gambiae* Giles in East Africa, by means of Marking and Release Experiments.** *Bull. Entom. Res.* 1961, Apr., v. 52, Pt. 1, 99–127, 9 text figs. & 2 pls. [15 refs.]

This paper should be read in the original by anyone concerned with the transmission of mosquito-borne diseases. The following is the author's summary:—

"An account is given of marking and release experiments with *Anopheles gambiae* Giles in a coastal area of Tanganyika. Laboratory-reared mosquitos were used, labelled either by the topical application of paint or by the introduction of radioisotopes into the larval breeding pans. Two different isotopes were used, $^{32}P$ and $^{35}S$, and recaptures were recognised by autoradiography.

"Routine catching stations were established within a circle of radius of $1\frac{1}{4}$ miles. Releases were made either in the centre or near the periphery of the experimental area, so that recaptures were possible up to a maximum of $2\frac{1}{4}$ miles.

"The following results were obtained:

"1. Of 132.000 mosquitos released, 1,019 were recaptured.

"2. The mean flight range of females released in the centre was estimated to be 0·64 mile, and of males 0·52 mile. Of females released on the periphery, the mean range of dispersion was estimated to be 0·98 mile. Individuals of both sexes were caught at the maximum range of 2¼ miles.

"3. The dispersion of recaptured mosquitos was shown to be non-random and to be related primarily to the distribution of human settlements.

"4. In certain series of releases the direction of the prevailing wind had a definite effect on the dispersal of mosquitos. But in general this was a minor factor.

"5. Dispersion during the first day or, in many instances, during the first two days after release was more restricted, compared with that of older mosquitos. But no difference in the distribution of catches was detected between those aged three-nine days and those more than nine days old.

"6. Marked females were recaptured up to 23 days after release. Apart from the first two days, the regression of density on age amounted to a daily loss of 16 per cent. of mosquitos from the experimental area. The effect of emigration could not be assessed quantitatively, but it was held to be a minor component of the total daily loss. The relatively high level of mortality suggested by these figures is attributed to the use of laboratory-reared mosquitos.

"7. The corrected sporozoite rate in marked females at the time of recapture was 0·8 per cent.

"8. The survival of males was only slightly lower than that of females.

"9. It is concluded from the survivorship curve that the mortality rate remained constant throughout the period in which marked females were recovered."

RAHMAN, J., SINGH, M. V. & SINGH, N. N. **A Note on the Study of Morphology, Prevalence and Host Preference of an Ecocline of *A. fluviatilis* in Nainital Tarai (U.P.).** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1960, Sept.–Nov., v. 8, Nos. 5/6, 137–42, 1 fig.

The authors suggest, apparently from less than 1 year of systematic observation, that an atypical form of *Anopheles fluviatilis*, with the apical pale band of the palpi [rather variably] divided by a darker band, is restricted to the winter months, October to April. Out of 11 females of the atypical form positive for precipitin tests, 7 had fed on human blood, compared with 10 out of 22 females of the typical form. *B. R. Laurence*

SPENCER, Margaret. **Pre-Operational Entomological Report, April, 1960.** *Papua & New Guinea Med. J.* Port Moresby. 1961, Mar., v. 5, No. 1, 21–3, 1 map.

The only anopheline found during entomological surveys in Nissan Island, New Guinea, was *A. farauti*. Details are given of investigations to assess its daily mortality and its susceptibility to DDT. *M. J. Colbourne*

MUÑIZ, R. & BARRERA, A. Capacidad de diferenciacion de tonos claros y obscuros con datos sobre la orientación geotactica en mosquitos. [**Ability of Mosquitoes to Differentiate between Clear and Dark Tones and Observations on Geotaxis**] *Acta Zool. Mexicana.* 1960, Dec. 30, v. 4, No. 6. 1–10, 3 figs: English summary.

The authors here report the results of two experiments rather arbitrarily designed to study, in the mosquitoes *Anopheles albimanus, A. aztecus, A. quadrimaculatus, Culex quinquefasciatus* [*fatigans*] and *Aedes aegypti*, the distribution of adult females settling on variously toned surfaces.

The apparatus was a cylindrical, transparent, plastic box 80 cm. in diameter and 20 cm. deep suspended with axis horizontal from the ceiling of a naturally lighted room. The inside of one face, which was in the form of a shallow cone projecting outwards, was lined with sectors of the various surfaces. In each test 20 female mosquitoes were introduced into the box and their distribution on the test surfaces recorded 27 times during the day. After each count the mosquitoes were disturbed and after every three counts a different sector was rotated into the vertical.

In the first experiment in which six equal sectors were coloured black, white and grey [no indication of relative density of the grey], all the mosquitoes showed a strong preference for black over the two other shades combined. It was also noticed that the majority rested in the upper half of the apparatus, a fact attributed to negative geotaxis [but which might simply be due to differing illumination or colour of the floor beneath the apparatus and the ceiling above, perceived through the transparent walls of the box].

In the second experiment four quadrants were given black and white patterns as follows: (1) 10 cm. square checks, (2) alternating 5 cm. wide stripes, (3) 15 cm. square checks and (4) a single 9 cm. black spot in the centre of the white quadrant. With the exception of 4 [in which the black to white ratio was far from unity] most of each species, whether fed or unfed, settled on the black parts and preferred the coarser-patterned quadrants. [There is no discussion of these results and no reference in the text to any of the body of relevant literature.] *G. A. H. McClelland*

BEARN, J. G. **Spontaneous Rupture of the Malarial Spleen. A Case Report and some Anatomical and Pathological Considerations.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1961, May, v. 55, No. 3, 242–5. [37 refs.]

The author describes the case of an apparently healthy corporal in the Royal Air Force, aged 34, whose spleen ruptured while he was taking off his shoes after lunch. He had had a short attack of malaria 3 months previously. At operation the enlarged and adherent spleen was found to be ruptured on the convex surface near the anterior border, as a result of an extensive subcapsular haematoma breaking through the capsule. Removal of the spleen was difficult and blood transfusion necessary.

Two days after operation the patient had a rigor and parasites (*Plasmodium malariae*) were found in the blood.

The author then discusses the anatomical and pathological mechanism.

*A. C. E. Cole*

CLYDE, D. F. **Chloroquine Treatment for Malaria in Semi-Immune Patients.** *Amer. J. Trop. Med. & Hyg.* 1961, Jan., v. 10, No. 1, 1–4.

The author organized a trial of chloroquine in the treatment and suppression of malaria in semi-immune African patients in holoendemic malarial districts of Tanganyika in the neighbourhood of Muheza. The trial was designed to find the minimum effective dose of the drug, as he had reason to believe that the dosage usually recommended was unnecessarily high.

Patients selected for treatment were complaining of fever and presenting signs suggestive of malaria. Their parasite counts were required to be higher than would be expected in asymptomatic carriers in this holoendemic area, and the parasites were required to present as young filamentous rings.

Varying doses of chloroquine were used, the object being to find the smallest single dose successful in all the patients treated. Tables of results are given, and in summary effective treatment of those of 5 years of age and over was obtained with 120 mgm. of chloroquine base, of those 3–5 years of age with 75 mgm., of 1–2 years of age with 37 mgm., and of infants less than 1 year with 19 mgm. This contrasts with the usual recommendation of 300 mgm. base for those of 3–6 years of age, and of 600 mgm. for adults. Speed of clearance of symptoms was similar with all effective dosages, being approximately 24 hours; while clearance of parasitaemia, as determined by 8-hour blood slides, was 32–44 hours, both with the minimum effective dosage and with the heavier dosage.

Radical clearance of subtertian malaria was checked in a small group of schoolchildren 9–15 years of age, who came from their vacations in the holoendemic area to be boarders in a school in a non-malarial area. Those with subtertian malarial infection were treated with a single dose either at the older, more intensive, level or at the lower level found effective by the author. Both groups were effectively cleared and remained clear for 3 months.

The smaller doses showed a definite advantage in that while they were as effective as the larger doses they did not cause the vomiting and loss of drug which often occurred with the latter.

For suppression the author tried to find the dose and frequency of administration that would prevent recurrence of parasitaemia while the subject remained in the holoendemic area, after initial clearance of the blood by the doses used in treatment. 75 mgm. of base at 2-week intervals appeared adequate for older children and adults, and similar dosage to that used in treatment for infants and toddlers. Increasing the dose did not appear to extend the permissible interval between doses, parasites returning to the blood in 17–18 days in all persons living in the areas studied, where an infective bite might be expected every night.

[This careful work on effective dosage under natural conditions in holoendemic areas gives a welcome guide to all who have to organize treatment or suppression with limited funds.] *A. C. E. Cole*

MOORE, D. V. & LANIER, J. E. **Observations on Two *Plasmodium falciparum* Infections with an Abnormal Response to Chloroquine.** *Amer. J. Trop. Med. & Hyg.* 1961, Jan., v. 10, No. 1, 5–9. [15 refs.]

The authors report two cases of patients infected with *Plasmodium falciparum* who did not respond adequately to chloroquine treatment. Both were white

citizens of the United States, and both acquired their infections in Colombia, South America.

The first patient had two relapses after adequate chloroquine treatment, both oral and intramuscular, in South America. He had 3 further courses of 1·5 gm. chloroquine and also a course of primaquine in the United States, and had clinical and parasitic relapses after 12 and 8 days. After the third course the drug was continued at 300 mgm. daily for 14 days and during this period parasites persisted in the blood. Tests showed that the chloroquine was being absorbed, and that the plasma level reached 274 μgm. per litre, and that it was being excreted well in the urine. Quinine sulphate 30 grains a day for 3 days was then added and this cleared the blood of parasites, which however reappeared in 17 days. A further 10-day course of quinine, at 30 grains a day, appeared to produce a cure.

The second patient had a course of treatment in South America, relapsed after about 6 weeks on his return to the United States with numerous *P. falciparum* ring forms in the blood. He was given 2·1 gm. chloroquine but parasites persisted, and he was then given primaquine 15 mgm. a day for 14 days. Though the parasites disappeared at first there was a clinical and parasitic relapse after 21 days. He was then treated with quinine sulphate, 30 grains a day for 10 days, with apparent success. No clinical relapse occurred, and twice-weekly blood examination did not reveal any ring forms during a period of 3 weeks, though some gametocytes persisted. *A. C. E. Cole*

WALTER, C. J. **Retinopathy following Chloroquine Therapy.** *Med. J. Australia.* 1961, May 20, v. 1, No. 20, 741–2, 1 fig.

The condition followed prolonged treatment of lupus erythematosus.
[See this *Bulletin*, 1960, v. 57, 8.]

GUTIÉRREZ BALLESTEROS, E. & GÓMEZ P., R. Pirimetamina-primaquina en el tratamiento del paludismo agudo. (Estudio en veinte casos.) [**Study of 27 Patients with Acute Malaria treated with a Pyrimethamine-Primaquine Combination**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1960. June, v. 20, No. 2, 95–8. English summary (5 lines).

The author treated 20 patients with *Plasmodium vivax* (10 induced) and 7 with *P. falciparum* infection (6 induced) with tablets each containing 0·025 gm. pyrimethamine and 0·010 gm. primaquine: adult patients received a single dose of 3 tablets by mouth.

The results are tabulated and compared with studies of other drugs. The average time of disappearance of fever was 50 hours in *P. vivax* infections and 56 hours in *P. falciparum*: the corresponding figures for disappearance of parasites were 90 and 84 hours. Gametocytes of *P. falciparum* persisted for 3 to 17 days (average 10).

The object of the study was to determine whether there was any synergic action, and there was apparently none. *H. J. O'D. Burke-Gaffney*

ARNOLD, J., ALVING, A. S., CLAYMAN, C. B. & HOCHWALD, R. S. **Induced Primaquine Resistance in vivax Malaria.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1961, July, v. 55, No. 4, 345–50, 2 figs. [11 refs.]

The object of this study was to determine the capacity of primaquine to produce drug resistance to malarial infection when taken in suboptimal dosage.

The subjects of the experiment were inmate volunteers of Stateville Penitentiary, all of whom had been previously infected with the original Chesson (South Pacific) strain of *Plasmodium vivax* malaria and had been cured 6 months or more before the trial started. Partially immune subjects were chosen in order to simulate field conditions as closely as possible. These were subinoculated in sequence with a substrain of the Chesson strain.

The first 16 volunteers subinoculated were each treated 2 days after the development of parasitaemia and fever with primaquine at a dosage of 22·5 mgm. base per day against the first infection, later infections being treated with higher doses. The drug was given in 6 divided doses daily for 7 to 14 days. Some modification of therapeutic response was noted in this phase of the experiment.

From the 16th to 31st subinoculations it was possible to increase the dose of primaquine without appreciably curtailing the parasitaemia. 19 volunteers were inoculated in this phase, receiving 60 to 120 mgm. of primaquine daily in 6 divided doses. In this phase, drug administration was started on the third day after subinoculation, regardless of the appearance of parasitaemia or fever, and was continued usually for 14 days unless the attack required an earlier termination.

After 36 subinoculations trophozoite resistance to primaquine had reached a point where maximum tolerated doses of the drug had no action on parasitaemia and fever. During this programme gametocytes were observed to form and were transmitted through mosquitoes to the stage of mature and apparently viable sporozoites. These failed, however, to infect man.

The authors note that this induced resistance to primaquine provides an additional reason for always using it in conjunction with an effective blood schizontocide. *G. Covell*

INTERNAT. COOP. ADMIN. EXPERT PANEL ON MALARIA [SOPER, F. L., Chairman]. **Report and Recommendations on Malaria: a Summary.** *Amer. J. Trop. Med. & Hyg.* 1961, July, v. 10, No. 4, 451–502, 1 fig.

This report represents the views of a panel of American experts convened by the International Cooperation Administration (ICA), which met on 4 occasions during the period January–April 1960.

Its terms of reference were to (1) assess the progress of world-wide malaria eradication and consider the future position of the United States on this subject; (2) estimate future programme requirements in time, personnel, commodities and research, and predict the future of malaria eradication; (3) review the overall financial situation, estimate future costs and advise on how to induce other countries to contribute to those costs; (4) examine and advise on special epidemiological features, summarize technical problems and provide sound orientation; (5) assess ICA relationship to malaria eradication and advise on ICA administrative problems; and (6) advise how malaria eradication in Africa can be undertaken effectively.

Section 1 of the report provides a historical background to the subject, covering the period from the discovery of the malaria parasite to the meeting of the World Health Assembly in 1948, where a high priority for malaria control was established.

Section 2 describes the change of concept of malaria control to that of eradication after the resolution of the XIVth Pan American Sanitary Conference in 1954 and the recommendation of the UNICEF/WHO Joint Committee of 1955 and that of the VIIth World Health Assembly in the same year, which urged the implementation of a programme having as its ultimate objective the world-wide eradication of malaria and established a special account to receive and use voluntary contributions from whatever source for financing WHO malaria eradication efforts. UNICEF not only accepted the eradication concept but declared that it would no longer supply insecticide and equipment for malaria control, but only for eradication.

In 1957 the United States made a contribution of $1,500,000 to the Special Malaria Eradication Fund. Since then, through ICA, the United States has expended over $85 million in cooperative malaria eradication projects and in contributions to the Special Malaria Funds of PAHO and WHO.

Section 3 traces the progress of malaria eradication up to the time of submission of the report. Eradication has been completed in 18 countries, with a population of 108 million living in once malarious areas. Eradication programmes are in progress in 66 countries with a population of 893,501,000 formerly exposed to malaria infection. Twenty countries are listed as preparing for malaria eradication, negotiations are under way for malaria eradication programmes in another 12, while no eradication programme is as yet contemplated in 37 other countries, with a population of 43 million exposed to malaria.

Section 4 is devoted to technical considerations of eradication campaign—delineation of areas to be sprayed, time and duration of spraying operations, special measures for dealing with fringe and mobile populations, immigration, pilgrimages, nomadism, etc., insecticide dosage and cycle, resistance of mosquitoes to insecticides, conditions calling for the use of chemotherapy and the problem of drug resistance.

Section 5 deals with organization and administration—planning of measures to be used in the various phases of the campaign, recruitment and training of staff, finance, logistics and health education.

Section 6 is devoted to a consideration of costs, Section 7 to evaluation, Section 8 to various political problems and Section 9 to international responsibility in malaria eradication.

Section 10 reviews the special problems posed in tropical Africa. The panel feels that the present *modus operandi*, with ICA and WHO approaching governments individually to develop national projects, does not meet the African situation adequately. It recommends that ICA study the malaria problem of tropical Africa as a whole and cooperate intimately with WHO in the development of a regional programme.

Section 11 discusses the social implications of malaria eradication with special reference to population growth.

The panel concludes that malaria eradication is feasible and that the results of world-wide malaria eradication campaigns are encouraging, despite the considerable number of obstacles to progress which remain to be surmounted. Insecticide resistance is not an insoluble problem and adequate research will

provide means for achieving the final objective. The use of drugs will continue to be an important adjunct to programmes of malaria eradication. Continued research is needed to produce a drug with prolonged preventive action, preferably up to 6 months, and to solve the problem of drug resistance. An annex gives examples of some actual eradication programmes. *G. Covell*

BRYDON, H. W., JOSHI, G. & PRADHAN, S. *Anopheles* **Distribution and its relation to the Malaria Eradication Program in Central Nepal.** *Mosquito News.* 1961, June, v. 21, No. 2, 102–5, 3 figs.

REV. SALUD PÚBLICA BOLIVIANA. 1961, Mar. 15–May 15, v. 2, No. 4, 18–26. 2 charts. Campaña Nacional de Erradicación de la Malaria en Bolivia hasta el año 1961. [**The Malaria Eradication Campaign in Bolivia up to 1961**]

The Special Malaria Investigation Service was set up in Bolivia in 1956 and help was given by the U.S. International Cooperation Administration, UNICEF, and WHO. From July 1957 to August 1958 activity was concentrated on the investigation of areas where the disease had yet to be recognized and in carrying out work designed to convert the investigation into eradication areas by inspections, education and the like.

It was calculated that about 840,000 sq. km. (78% of the whole country) was malarious, the malarial morbidity rate was 820 per 100,000 and the mortality rate for the disease 35 per 100,000. Out of 32,185 blood films 1,741 were positive, 1,317 for *Plasmodium vivax*, 339 for *P. falciparum*, 360 for *P. malariae*, and 170 mixed infections [it is not clear how the total is made up].

The eradication programme proper was begun on September 1, 1958. The country was divided into zones and these into sectors, and teams using various methods of transport carried out an energetic spraying campaign with residual insecticides (DDT and dieldrin) at 6-month and yearly intervals respectively, though after the 5th spraying cycle DDT only was used.

It is considered that if the existing programme is continued the work of eradication will be practically completed by 1962; then the stage of surveillance will be reached, involving prevention of imported cases and attacks on possible foci of reinfection.

Some figures extracted from the various tables are impressive. Between September 1, 1958, and December 31, 1960, nearly 700,000 houses have been sprayed; blood films examined were 3,426 with 7·5% positive in 1958; 83,762 with 2·35% positive in 1959; 88,689 with 0·98% positive in 1960. The reduction in cases of malaria is thus striking, while the percentage of malarious areas has fallen from 22·8 to 4·2.

[This report is no doubt a very useful summary for persons living in Bolivia, but it should be remembered that such reports are also of great interest to others. Hence some details on the vector(s), topography, and amounts of DDT per sq. metre used would have been very interesting.]

*W. K. Dunscombe*

Arzube R., M. E. Resistencia al dieldrin presentada por *A.* (*N.*) *albimanus* y *A.* (*Ar.*) *punctimacula* en algunas localidades de la costa ecuatoriana. [**Resistance to Dieldrin by** *Anopheles albimanus* **and** *A. punctimacula* **in Coastal Areas of Ecuador**] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1960, Apr.–June, v. 17, No. 2, 127–37, 1 map & 1 graph.

See also this *Bulletin*, 1960, v. 57, 221.

Uvo, D. & Dias, J., Jr. Suscetibilidade do *Anopheles darlingi* e outros anofelinos ao DDT e ao dieldrin no municipio de Araçatuba. [**Susceptibility of** *Anopheles darlingi* **and other Anophelines to DDT and Dieldrin in Araçatuba, Sao Paulo, Brazil**] *Arquivos de Hig. e Saúde Pública.* S. Paulo. 1961, June, v. 26, No. 88, 133–5.

The English summary appended to the paper is as follows:—

"Some tests were made for measuring the resistance of *Anopheles darlingi* malaria vector in the region concerned and *Anopheles albitarsis albitarsis*, *A. rondoni* and *A. strodei*. *A. darlingi* showed to be very susceptible to DDT and DL [dieldrin]. In fact, the $LC_{100}$ obtained with DDT was of 2% and with DL was of 0·8%. The same was observed with the other species which were exposed to the DDT papers only."

Corradetti, A., Neri, Italia & Scanga, Maria. Segnalazione in Italia di *Plasmodium praecox* var. *matutinum* in *Turdus iliacus*, e separazione di questo plasmodio da *Plasmodium praecox* come specie distinta: *Plasmodium matutinum* Huff, 1937. [**The Discovery in Italy of** *Plasmodium praecox* **var.** *matutinum* **in** *Turdus iliacus*, **and its Separation as an Independent Species,** *P. matutinum*] *Parassitologia.* Rome. 1960, Dec., v. 2, No. 3, 333–43, 8 figs. on pl. & 2 graphs. English summary.

In 1937 Huff (*J. Parasit.*, 1937, v. 23, 400) described a new variety of *Plasmodium relictum* from the robin in North America, which he called var. *matutinum*. This name was amended to *P. praecox* [=*relictum*] var. *matutinum*, and 2 more similar strains (from thrushes and sparrows) were also recorded from the United States [see, for example, this *Bulletin*, 1941, v. 38, 513]. In the present paper the authors report the finding of the same parasite from a thrush, *Turdus iliacus*, in Italy. Its morphology, life cycle, periodicity and other features corresponded to those of Huff's variety. As this parasite differs markedly from the type, *P. praecox*, the authors propose to raise the variety in question to the status of an independent species, under the name *P. matutinum* Huff, 1937. It is noted that the 4 known strains of this parasite show significant biological differences when inoculated into canaries. These are attributed to the fact that the strains in question originated from 4 distinct hosts, and might actually be undergoing differentiation in the process of speciation.

A series of photomicrographs illustrate various stages of development of *P. matutinum*. *C. A. Hoare*

## TRYPANOSOMIASIS

*In this section abstracts are arranged as far as possible in the following order*:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed*:—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

Scott, D. **A Recent Series of Outbreaks of Human Trypanosomiasis in Northern Ghana (1957–1959). Some Advances in Appreciation of the Epidemiology of the Disease made from their Study.** *West African Med. J.* 1961, June, v. 10 (n.s.), No. 3, 122–39, 1 graph & 3 maps.

From about 1915, over a period of 25 years, epidemics of human trypanosomiasis due to *Trypanosoma gambiense* occurred at different times throughout western tropical Africa. The pandemic appears to have travelled westwards. The Belgian Congo was affected first, and the last epidemics seem to have occurred in the border area of Sierra Leone, Liberia and Senegal, in the 1940's. After an epidemic, the disease entered a quiescent phase locally, with low incidence in some persistent foci only. It is believed to be subject to periodic epidemic cycles, and therefore its recent history in Ghana is of more than local interest.

In Ghana the main epidemic occurred between 1930 and 1950, with two major foci, both in the savannah of northern Ghana. By 1941 incidence in the principal foci had been greatly reduced, and the former upward trend of the disease outside these foci had been reversed. An epidemiological assessment based on field surveys made between 1950 and 1956 showed very low incidence, less than one person in 1,000 being infected, and a downward trend was being maintained. At this time there were 5 localities in which trypanosomiasis continued to occur at relatively high rates, and 9 other localities in which, though less prevalent, it showed a particular liability to occur. Between 1957 and 1959, however, 4 distinct outbreaks of trypanosomiasis were discovered. In one, more than 900 cases occurred in a population of 60,000; in a single village 59 cases were found among 180 inhabitants. A complete survey of this area in 1951–52 had revealed only a low endemic incidence. The other outbreaks were on numerically small scales, but represented sudden and significant exacerbations in known but previously quiescent foci. There is evidence to suggest that at least 2 of the smaller outbreaks were caused by a strain of trypanosome derived from the main outbreak; in fact, that an epidemic strain has arisen.

*Glossina palpalis* is the principal vector of trypanosomiasis in Ghana, with *G. tachinoides* of much less importance. Man-fly contact tends to be closest towards the fringe of distribution of *G. palpalis*, where the fly's habitat is restricted to the environs of rivers and waterholes, and it is in such regions that the main Ghanaian epidemics have taken place. It is significant that in the recent epidemics the normal sex incidence has changed, women being increasingly affected. This suggests that climatic changes, too small to be revealed by the meteorological observations available, may have altered the exact distribution of *G. palpalis* at the very verges of its habitat, thus creating sites of transmission closer than formerly to certain villages. This theory is not incompatible with that of the appearance of an epidemic strain of trypanosome.

Clinically the infection was very mild. Only 8 of the first 1,000 patients are known to have died: only 131 of the first 794 diagnosed had any clinical

symptoms: although the biggest outbreak had started probably about a year before it was discovered, only 10·3% of cases were in the third stage, *i.e.* had more than 40 cells per cmm. and more than 40 mgm.% protein in the cerebrospinal fluid. It is precisely this insidious type of infection that has caused such devastation in the past.

The main lesson to be learned from the experience of these outbreaks is the age-old one that static treatment centres, even if well known and accepted by the community [there are at least 2 such centres in the area of the main outbreak] do not give any warning of trypanosomiasis outbreaks. The only method of detection in endemic areas is the field survey, which must be repeated from time to time in order to reveal trends in incidence and persistent foci. Secondly, the enhanced importance of *G. palpalis* near the limit of its distribution is emphasized. [Evidence of the possible resurgence of *T. gambiense* continues to accumulate. Much of it is not written down, but see Morris, this *Bulletin*, 1961, v. 58, 177, and Shore, *ibid.*, 1960, v. 57, 1247.]

*B. B. Waddy*

Glasgow, J. P. **Selection for Size in Tsetse Flies.** *J. Animal Ecology*. 1961, May, v. 30, No. 1, 87–94, 4 figs. [12 refs.]

Comparison, by measurements of the middle section of the 4th longitudinal wing vein, of large samples of wild-caught tsetse from Tanganyika with samples of flies reared from puparia collected in the same area has shown that populations of wild *Glossina morsitans* were losing about 12% of their smallest males, although no conclusions could be drawn about the female population; and that male *G. swynnertoni* did not show a size-differential mortality, although in the female population of this species the largest and smallest females tended to be eliminated.

The causes of these apparent differential mortalities were not established, but 34 males of *G. swynnertoni* captured as the prey of 2 species of Asilidae did not provide any evidence of size selection by these predators.

[See also this *Bulletin*, 1960, v. 57, 1027.] *B. R. Laurence*

Bursell, E. **The Behaviour of Tsetse Flies (*Glossina swynnertoni* Austen) in relation to Problems of Sampling.** *Proc. Roy. Entom. Soc. of London*. Ser. A. 1961, Apr. 25, v. 36, Pts. 1/3, 9–20, 1 fig. [29 refs.]

Samples of tsetse flies captured in 4 different ways—(1) by a standard catching party of 3 people, (2) while the flies were probing a cow in the shade, (3) at their resting places on trees, and (4) on a slow moving lorry—have been analysed for fat content and percentage residual blood meal (estimated). The following cycle of events in the hunger cycle of male tsetse is postulated from this analysis.

Firstly there is a phase of almost complete inactivity, while the blood meal is concentrated by excretion of water, the rate of digestion is high and the products of digestion are converted to fat. These flies are unresponsive to moving objects and bait animals.

After partial digestion of the blood meal and replenishment of fat stores the flies become active, and flies with relatively abundant fat reserves follow a

moving object (" sexual appetite behaviour ") and are especially well represented in the standard catch.

A third phase of the hunger cycle comes after a waning of the response to moving objects, when the flies have a low fat content and low residual blood reserve. These flies are active and are well represented in the bait catch. A possible fourth phase may be found when flies exhausted of reserves may react towards a moving object and are then found in the standard catch.

The implications of these results are discussed with reference to " host specificity " to animals that tend to rest in shade and to the use of the standard catch in tsetse population studies as a measure of the apparent density of flies.

[It is a little difficult to relate completely the author's descriptions of the phases of the hunger cycle to the experimental results given in this paper. The author's descriptions are, however, tentative and are based on previous, and also on unpublished, work. See this *Bulletin*, 1960, v. 57, 793, (886); 1961, v. 58, 421, (571).] *B. R. Laurence*

GLASGOW, J. P. **The Feeding Habits of** *Glossina swynnertoni* **Austen.** *J. Animal Ecology*. 1961, May, v. 30, No. 1, 77–85, 1 fig. & 1 pl. [13 refs.]

The author gives detailed observations on the behaviour of *Glossina swynnertoni* in Shinyanga, Tanganyika, during and after feeding and, by marking and recapture methods, an estimate of the interval between feeds in this species. The flies showed a preference for feeding on man in the shade. The interval between feeds of flies marked during feeding and recaptured subsequently at a further feed was 1 to over 15 days in males and 1 to 8 days in females. In April the mean interval in days for females was 3, significantly less than the mean 4-day interval for males, and in July the mean interval for females was 5 days, significantly more than the mean interval for males of 4 days. Many females fed in April after 1 or 2 days, whereas none fed in July in less than 3 days. *B. R. Laurence*

SMITH, I. M. & RENNISON, B. D. **Studies of the Sampling of** *Glossina pallidipes* **Aust. I. The Numbers caught daily on Cattle, in Morris Traps and on a Fly-Round.** *Bull. Entom. Res.* 1961, Apr., v. 52, Pt. 1, 165–82, 3 figs. [28 refs.] **II. The Daily Pattern of Flies caught on Cattle, in Morris Traps and on a Fly-Round.** *Ibid.*, 183–9, 2 figs. [15 refs.]

Two experiments are described in the first paper which were planned to test the validity of methods of catching tsetse—the fly round, trapping, and cattle bait catches—as estimates of the population of *Glossina pallidipes* biting cattle, in view of the need to establish the trypanosome challenge when prophylactic drugs are administered against bovine trypanosomiasis.

The numbers of tsetse caught by the various methods were, in general, not correlated, and it is suggested that the fly round and trap collection do not give a valid estimate of the number of tsetse likely to attack cattle. Differences were found in the attractiveness of differently coloured cattle and also differently coloured traps.

In the second paper the daily pattern of activity estimated by the three

catching methods is compared. Bait catches showed greater activity early and late in the day, whereas traps collected more flies around mid-day. Fly round catches of females during the dry season resembled the pattern shown by the bait catches, but fly round catches of males did not show the late peak of activity suggested by catches of males on bait. *B. R. Laurence*

CHAPMAN, R. F. **Some Experiments to Determine the Methods used in Host-Finding by the Tsetse Fly, *Glossina medicorum* Austen.** *Bull. Entom. Res.* 1961, Apr., v. 52, Pt. 1, 83–97, 10 figs.

The author describes some carefully designed experiments, carried out in Ghana, to test the reactions of adults of *Glossina medicorum* [this *Bulletin*, 1961, v. 58, 421] to the movement and smell of a potential host. Laboratory experiments, involving the use of a model train carrying a mat black screen, showed that movement of the screen resulted in an increase in activity of the fly, but field experiments showed that, although the flies responded to movement of a screen at a distance of 25 feet, they did not respond to movement at greater distances. *Glossina morsitans*, however, responded to a moving screen 150 feet away under the same conditions, and some flies responded at a distance of 200 feet. Vision in both species was not obviously affected by the presence or absence of sunlight.

Laboratory experiments with *G. medicorum* showed no obvious attraction to the smell of guineapig or goat, but field experiments showed an increase in activity in the presence of cows, despite the continued presence of the observer.

The flies also showed a marked upwind orientation in a wind tunnel, even when the eyes were covered by cellulose paint.

The author concludes that *G. medicorum*, which lives in thicket or forest where visibility is poor, responds initially to the smell of the host and that this is followed by an upwind orientation towards the host, and that the final approach is probably a visual reaction to movement. *B. R. Laurence*

KRAMPITZ, H. E. Kritisches zur Taxonomie und Systematik parasitischer Säugetier-Trypanosomen mit besonderer Beachtung einiger der in Wühlmäusen verbreiteten spezifischen Formen. [**Observations on the Taxonomy and Systematics of Parasitic Mammalian Trypanosomes with Special Reference to Some Specific Forms in Voles**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1961, v. 12, No. 2, 117–37, 12 figs. [Numerous refs.]

BECKER, E. R. **Effect of Salicylates and Related Compounds on Ablastic Response in Rats infected with *Trypanosoma lewisi*. I. Isomers of Salicylic Acid.** *J. Parasitology*. 1961, June, v. 47, No. 3, 425–7, 1 fig.

NEGHME R., A. & SCHENONE F., H. Resumen de veinte años de investigación sobre la enfermedad de Chagas en Chile. [**Twenty Years of Investigation on Chagas's Disease in Chile. A Review (1938–1958)**] *Rev. Med. Chile*. 1960, Feb., v. 88, No. 2, 82–93. [93 refs.] English summary.

Cornejo Donayre, A. & Lumbreras Cruz, H. E. [a] Estudios preliminares sobre epidemiología de la enfermedad de Chagas en el Valle de Majes, 1950. English summary. [b] Encuesta epidemiológica sobre enfermedad de Chagas en el Valle de Majes. Presentación de diez nuevos casos, 1951. [c] Estudios preliminares sobre epidemiología de la enfermedad de Chagas en el Valle de Camaná, 1951. [**(a) Preliminary Studies on the Epidemiology of Chagas's Disease in the Majes Valley, Peru, 1950. (b) Observations on 10 New Cases, 1951. (c) Preliminary Studies in the Camaná Valley, 1951**] Reprinted from *Archivos Peruanos de Patol. y Clin.* 1952, v. 4 & 5, 45 pp., 3 maps & 13 figs. [57 refs.]

Baquerizo A., L., Avilés N., F. & Mármol C., Fanny. Aislamiento de Tripanosoma cruzi por inoculación de suero humano en cerebro de ratón. [**Isolation of *Trypanosoma cruzi* by Inoculation of Mouse Brain with Human Serum**] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1959, July–Sept., v. 16, No. 3, 152–7, 1 fig.

Pifano C., F. Evaluación de los procedimientos de laboratorio empleado en el diagnóstico de la enfermedad de Chagas. [**Evaluation of Laboratory Methods Used in the Diagnosis of Chagas's Disease**] *Rev. Sanidad y Asistencia Social.* Caracas. 1959, May–Aug., v. 24, Nos. 3/4, 203–17. [23 refs.] English summary.

This paper is the same as that abstracted in this *Bulletin*, 1961, v. 58, 674.

Berríos, A. & Zeledón, R. Estudio comparativo entre los antígenos de *Schizotrypanum cruzi* y de *Strigomonas oncopelti* en la reacción de fijación del complemento para enfermedad de Chagas. [**Comparative Study of Antigens of *Trypanosoma cruzi* and *Strigomonas oncopelti* in the Complement-Fixation Test for Chagas's Disease**] *Rev. Biologia Trop.* San José, Costa Rica. 1960, Dec., v. 8, No. 2, 225–31. English summary.

In the past antigens of various trypanosomid flagellates were successfully employed in the complement-fixation test for Chagas's disease. In the present study, the results of tests with 57 sera that reacted positively with antigens of *Trypanosoma cruzi* are compared with those obtained with antigens of the insect-flagellate, *Strigomonas oncopelti*. The antigens were represented by cultural forms of these two species, while the tests were carried out by Kolmer's qualitative and Freitas's quantitative methods. Sera from cases of cutaneous leishmaniasis and from normal persons were used as controls. It was shown that the *Strigomonas* antigen failed to fix complement in the qualitative test and gave lower titres in the quantitative test. It was also less specific than the *T. cruzi* antigen, since it also reacted more strongly with sera from cases of leishmaniasis [this *Bulletin*, 1961, v. 58, 182]. *C. A. Hoare*

Berríos, A. Investigaciones sobre enfermedad de Chagas en Costa Rica por la reacción de fijación del complemento. [**A Survey of Chagas's Disease in Costa Rica by the Complement-Fixation Test**] *Rev. Biologia Trop.* San José, Costa Rica. 1960, Dec., v. 8, No. 2, 203–17. [32 refs.] English summary.

The author carried out complement-fixation tests for Chagas's disease by the Kolmer and Freitas [this *Bulletin*, 1952, v. 49, 606] techniques on 1,000 sera of patients and blood donors from 2 hospitals in Costa Rica. Sera from known cases of Chagas's disease and of cutaneous leishmaniasis, as well as from normal persons, were used as controls.

In the tests by Kolmer's method, 61 sera were positive and 29 doubtful, while in tests by the Freitas method the corresponding reactions were 65 and 17. Positive reactions were also obtained with sera of patients suffering from Chagas's disease and with that from one patient with leishmaniasis (in the latter case, triatomid bugs were found in the patient's home). A comparison of the two techniques showed agreement among the positive reactions, but not among the doubtful reactions. The Freitas method is regarded as being more specific.

*C. A. Hoare*

Schiavi, A. & Ribeiro, A. P. Sôbre a ação de inseticidas aplicados sob forma de gases no combate aos triatomíneos vetores de doença de Chagas. [**The Action of Gaseous Insecticides against Triatomids**] *Arquivos de Hig. e Saúde Pública.* S. Paulo. 1961, June, v. 26, No. 88, 125–31. English summary (9 lines).

The authors, who are medical officers in the service dealing with the eradication of malaria and the prophylaxis of Chagas's disease in the state of São Paulo, Brazil, state that in their opinion the present practice of dealing with the triatomid vectors of Chagas's disease by means of spraying an aqueous suspension of BHC on the walls of infested houses is by no means the best, as even several months after spraying, living bugs can be found in their hiding places. The authors consider that the cause of this is the repellent action of the delta-isomer, while DDT and dieldrin have been shown not to be very toxic to *Triatoma infestans.*

They therefore tried using gamma BHC in smoke or gaseous form in rural areas where Chagas's disease was endemic and where the houses were of very poor construction indeed and heavily infested with triatomids. 42 houses in 3 rural areas were selected and divided into 2 groups: (A) 29 houses treated with the smoke from a commercial product containing BHC used in other parts of the state as an anti-frost measure; (B) 13 houses treated with the smoke obtained by heating ordinary BHC. In this case the amount of BHC used per house varied from 150 to 400 gm.

The results showed that the best results were obtained in group B, all the houses showing either a very marked reduction or absence of *T. infestans* even 105 days after treatment. The BHC in the gaseous form had a high degree of penetration and toxicity for the insects, and this procedure is considered to be simple and efficacious.

*W. K. Dunscombe*

ALENCAR, A. O sistema nervoso autônomo do coração na infestação experimental do camundongo albino pelo *Schizotrypanum cruzi*. [**The Autonomous Nervous System of the Heart in Experimental Infection of Mice with** *Trypanosoma cruzi*] *Arquivos Brasileiros de Med.* 1960, Mar. & Apr., v. 50, Nos. 3/4, 95–102, 6 figs. [18 refs.] English summary.

The author studied the effect of *Trypanosoma cruzi* on the intracardiac nerve ganglia in sections of the heart of mice infected experimentally with a Brazilian strain of the parasite. The findings were compared with those in an equal number of normal control mice. The examination of sections revealed infiltration of cardiac ganglia by numerous round cells and histiocytes, but the inflammary process is not regarded as specific to the ganglia, since it was also present throughout the myocardium. However, in animals killed 15–30 days after inoculation, the infiltration tended to concentrate around the ganglia. Nevertheless, when examined by specific staining methods, the nerve cells had a normal appearance. *C. A. Hoare*

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## LEISHMANIASIS

*In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.*

AMATO NETO, V., DE QUEIROZ, R., CAMPOS, R., ELKIS, H. & MEIRA, J. A. Pneumonia intersticial no calazar: estudo radiológico retrospectivo de dezessete casos da doença. [**Interstitial Pneumonia in Kala Azar. Retrospective Radiological Study in 17 Cases**] *Rev. Inst. Med. Trop. São Paulo.* 1960, Mar.–Apr., v. 2, No. 2, 108–11, 2 figs. English summary (8 lines).

CARTA, A. Primo focolaio de leishmaniosi canina identificato nella città di Sassari dopo la lotta antianofelica. [**The First Focus of Canine Leishmaniasis identified in the City of Sassari after the Anti-Anopheline Campaign**] *Riv. di Parassit.* Rome. 1961, June, v. 22, No. 2, 89–92. English summary.

JACKSON, R. **Cutaneous Leishmaniasis in Canada.** *Canadian Med. Ass. J.* 1961, July 8, v. 85, No. 2, 85–8, 5 figs.

An account of 4 cases in immigrants from Italy and a review of the literature.

CHADLI, A. & PHILIPPE, E. Étude histopathologique de la leishmaniose cutanée à *Leishmania tropica.* **[Histopathological Study of Cutaneous Leishmaniasis]** *Arch. Inst. Pasteur de Tunis.* 1961, June, v. 38, No. 2, 91–107, 2 figs. on pl. [34 refs.]

A short review of the published work on the histology of oriental sore is followed by a report on the detailed study of 9 cases seen in the Pasteur Institute in Tunis. The cases were classified into 4 groups according to their histological appearances. This grouping corresponded with the stage of evolution of the lesion as shown by the length of history and the speed and intensity of the tissue reaction.

The first stage was characterized by a cellular proliferation in the superficial dermis consisting mainly of histiocytes, plasma cells and eosinophils with a moderate number of parasites.

In the second stage the cellular proliferation was much greater, with a marked predominance of histiocytes and macrophages, many of them containing numerous parasites. In the deeper layers of the dermis some of the histiocytes had fused to form Langhans-type giant cells.

The third stage showed continued cellular proliferation with clusters of cells lying in the deeper layers of the dermis. These cell masses resembled syphilitic or tuberculous granulomas with giant cells in the centre but without necrosis and sometimes containing parasites, and surrounded by lymphocytes and plasma cells. Parasites at this stage were generally scanty.

The fourth stage showed fibrosis in the superficial dermis with syphilitic type of granulomas in the deeper layers. Parasites were very scanty. This stage heralded resolution of the lesion.

At the first conference on cutaneous leishmaniasis held at Ashkhabab in 1940 two types of oriental sore were described [this *Bulletin,* 1944, v. 41, 331]: a moist type with a short incubation period, endemic in rural areas, with rodents as the normal host, man only being occasionally infected; and a dry type with a long incubation period, endemic in urban areas, and probably confined to man and dogs. The cases presented in this paper appeared to belong to the dry type.

The findings are described at length, tabulated and illustrated in 2 photomicrographs. *W. P. Stamm*

PESSÔA, S. B. Classificação das leishmanioses e das espécies do gênero *Leishmania.* **[Classification of Leishmaniases and of Species of the Genus *Leishmania*]** *Arquivos de Hig. e Saúde Pública.* S. Paulo. 1961, Mar., v. 26, No. 87, 41–50. [16 refs.]

There is general agreement that various forms of visceral leishmaniasis throughout the world are due to one species, *Leishmania donovani,* while cutaneous leishmaniasis in the Old World is attributed to *L. tropica,* with two varieties or subspecies: *L. tropica tropica* (=*L. tropica minor*), responsible for the " dry " or urban type of the disease, and *L. tropica major*—for the " moist " or rural type.

However, very little is known about the nature and mutual relations of the diverse forms of cutaneous leishmaniasis in Latin America. In this critical

review, the eminent Brazilian parasitologist describes the different nosological types of the disease and proposes a new classification of the causative agents, all of which are regarded as subspecies of *L. braziliensis*. The characteristics of the New World cutaneous leishmaniasis are summarized in the accompanying synoptic table, compiled from the author's text and table, as well as from other sources.

| Clinical type | Aetiology | Epidemiology | |
|---|---|---|---|
| | | Geographical distribution | Reservoirs |
| I. With invasion of nasal mucosa: | | | |
| 1. *Malignant form* (Espundia): extensive cutaneous lesions; in over 80% of cases metastatic invasion of oro-naso-pharyngeal mucosa. | *L. braziliensis braziliensis* (=*L. tropica braziliensis* Biagi, 1953) | Hot and humid forest regions of South America. | Dog (rarely), Paca (*Cuniculus paca*) |
| 2. *Benign form* (Pianbois, Forest yaws, etc.): Benign cutaneous lesions; only 5% of cases with metastatic invasion of nasal mucosa: pharynx and larynx never involved. | *L. braziliensis guyanensis* (=*L. tropica guyanensis* Floch, 1954) | Equatorial forest regions of Guianas, Panama, Costa Rica. | Wild rats (*Proechimys, Hoplomys*) |
| II. Without invasion of nasal mucosa: | | | |
| 3. *Benign forms*: | | | |
| (a) Chiclero's ulcer, with ecthymatous lesions on external ear. | *L. braziliensis mexicana* (=*L. tropica mexicana* Biagi, 1953) | Forest regions of Mexico, Honduras, Guatemala. | Wild mammals (unknown) suspected |
| (b) Uta, with dry, papular, rarely ecthymatous, ulceration. | *L. braziliensis peruviana* (= *L. peruviana* Velez, 1913) | Arid regions of Western Andes (altitude 1200–3000 metres) in Peru, Bolivia, Ecuador. | Dog |
| 4. *Malignant form*: Extensive cutaneous lesions, tuberculoid type (leishmaniasis lepromatosa s. diffusa). | *L. braziliensis pifanoi* Medina & Romero, 1959 | Equatorial forests of Venezuela and Amazon region. | Not known |

*C. A. Hoare*

Jaffé, L. Südamerikanische Schleimhautleishmaniase. Erfahrungen in Panama und ein Überblick über den heutigen Stand der Therapie. [**Observations on American Mucocutaneous Leishmaniasis in Panama and a Survey of Current Therapy**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1961, v. 12, No. 2, 147–52. [12 refs.]

The English summary appended to the paper is as follows:—

"Thirty-five cases of American leishmaniasis of the upper respiratory passages were observed from 1944 to 1960 in the province of Bocas del Toro, Republic of Panama. Some of the lesions were advanced and severe. Spreading of mucocutaneous leishmaniasis in Panama as a consequence of cultivation of virgin land is possible.

"Seven different drugs for the treatment of the condition are discussed."

[See this *Bulletin*, 1961, v. 58, 431.]

BRENER, Z. Estudos terapêuticos em cobaias experimentalmente inoculadas com *Leishmania enriettii*. [**Therapeutic Studies on Guineapigs experimentally infected with** *Leishmania enrietti*] *Rev. Inst. Med. Trop. São Paulo*. 1960, Mar.–Apr., v. 2, No. 2, 71–7, 6 figs. [11 refs.] English summary.

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## FEVERS OF THE TYPHUS GROUP

*In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.*

BREZINA, R., URVÖLGYI, J., ROSICKÝ, B., CILKA, S., DUSHNIKU, N., NARACIK, K. & DISHNICA, G. **Rickettsioses and Infections caused by Viruses of the Psittacosis-Ornithosis-Mammalian Pneumonia Group, in Albania.** *J. Hyg., Epidemiol., Microbiol. & Immunol.* Prague. 1961, v. 5, No. 1, 85–8.

This paper gives the results of serological surveys made in 1959 to get information about the kinds of rickettsiae which occur in Albania.

Sera from 31 persons in the town of Shkoder who had been diagnosed as suffering from epidemic typhus during the period 1957–59 all gave positive complement-fixation reactions with antigens of *Rickettsia prowazeki* and *R. mooseri*, pointing to the endemicity of the disease in this locality.

Antibodies for *R. burneti* were found in 10 out of 216 sera (4·6%) from persons in Tirana and Shkoder, and were also present in the sera of 5 out of 132 cattle (3·8%), 30 out of 151 sheep (19·9%) and 3 out of 24 pigs (12·5%).

Tests with *R. murinus* antigens on 237 human sera gave 25 positive reactions (10·5%); of 144 sera tested with *R. conori* antigens, none was positive.

Antigens from a "neorickettsia" strain were used to detect antibodies for viruses of the psittacosis-ornithosis-mammalian pneumonia group. Positive results were obtained with 11 out of 243 sera (4·5%) from persons in the Tirana-Shkoder regions, and with 17 out of 139 cattle sera (12·2%), 14 out of 153 sheep sera (9·1%) and 7 out of 24 pig sera (29·1%). The authors remark that while recent years have brought repeated evidence of the infection of domestic animals with organisms of this group, the importance of the findings in relation to infections in human beings has still to be clarified. *R. S. F. Hennessey*

JUILLAN, M. & BATS-MAILLET, Y. Contribution à l'étude de la pneumonie expérimentale à *Rickettsia prowazeki* chez le lapin. II. Temps de coagulation et taux de prothrombine. Analyses chimiques diverses. Électrophorèse des protéinies sériques. [**Study of Experimental** *Rickettsia prowazeki* **Pneumonia in Rabbits. II. Coagulation and Prothrombin Times, Biochemical Tests, Electrophoresis of Serum Proteins**] *Arch. Inst. Pasteur d'Algérie*. 1961, Mar., v. 39, No. 1, 8–30, 1 fig. [89 refs.]

The authors, from the Pasteur Institute of Algeria, made a full study of the factors outlined in the title and present their results in great detail.

The principal findings were: a prolongation of coagulation time, but not of prothrombin time: moderately raised blood urea and marked albuminuria; decreased serum proteins but increased cholesterol; increased levels of serum alpha and beta globulins during the acute period, with subsequent reversion to normal and the appearance of increased gamma globulins; positive Kunkel phenol test and hyperlipaemia during the acute phase; other liver function tests were not altered significantly.

[See also this *Bulletin*, 1960, v. 57, 891.] *H. J. O'D. Burke-Gaffney*

Wisseman, C. L., Jr., Pazourek, L., Boccuti, A., James, H. & Oldstone, M. B. A. **Studies on Rickettsial Toxins. V. Dissimilarity between the Action of Rickettsial Mouse Lethal Toxin and Bacterial Endotoxin in Mice.** *J. Immunology*. 1961, June, v. 86, No. 6, 613–17, 2 figs. [16 refs.]

A comparison of properties of suspensions of *Rickettsia mooseri* (homogenized yolk-sac cultures) and *Escherichia coli* endotoxin (obtained by ethanol precipitation of a trichloracetic acid extract) showed that reticulo-endothelial blockade with colloidal iron significantly increased the susceptibility of mice to the lethal action of the bacterial endotoxin but not to that of the rickettsiae; that pre-treatment of mice with the bacterial endotoxin rendered them much more resistant to this preparation but not to the rickettsial preparation; and that an intravenous injection of 1 LD50 of the bacterial endotoxin caused an abrupt fall in the total leucocyte count in mice, whereas no comparable effect was produced by an injection of 1 LD50 of the rickettsial preparation.

"These findings lend further support to the idea that the mouse lethal toxin of *R. mooseri*, whatever its basic nature may ultimately prove to be, acts in a manner distinct from bacterial endotoxins."

[For Part IV see this *Bulletin*, 1959, v. 56, 289.] *R. S. F. Hennessey*

Shirai, A., Bozeman, F. Marilyn, Perri, S., Humphries, J. W. & Fuller, H. S. **Ecology of Rocky Mountain Spotted Fever. I. *Rickettsia rickettsii* recovered from a Cottontail Rabbit from Virginia.** *Proc. Soc. Exper. Biol. & Med.* 1961, May, v. 107, No. 1, 211–14, 1 fig.

A strain of rickettsia, which was identified as *Rickettsia rickettsi* by cross immunity and serological tests, was recovered from eggs and guineapigs inoculated with a suspension of spleen and liver tissue from a wild cottontail rabbit (*Sylvilagus floridanus*) trapped in Virginia in 1960. Attempts to isolate rickettsiae from 9 other rabbits trapped in various parts of Virginia were unsuccessful, but sera from 4 of these animals gave positive complement-fixation reactions with spotted fever group-reactive antigens. Similar antibodies have been found in sera from other wild mammals, including the red fox, grey fox, opossum, raccoon, white-footed wood-mouse, and deer.

The isolation of *R. rickettsi* from a naturally-infected meadow mouse (*Microtus pennsylvanicus*) collected in Virginia was reported in 1954 [this *Bulletin*, 1954, v. 51, 906].

It is now apparent that the cottontail rabbit can be a host of *R. rickettsi* and may be a source of infection to ticks. Further studies are being undertaken to evaluate more precisely the role of rabbits and other mammals in the ecology of *R. rickettsi*. *R. S. F. Hennessey*

WEYER, F. Weitere Beobachtungen und Versuche über das Verhalten von Rickettsien in Kleiderläusen. [**Further Notes and Studies on the Behaviour of Rickettsiae in Body Lice**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1961, v. 12, No. 2, 97–117, 16 figs. [16 refs.]

The author has studied the behaviour of various rickettsiae in lice infected either experimentally by intracoelomic or intrarectal inoculation, or naturally by feeding them on infected mice or guineapigs. Three strains pathogenic for man were investigated, a virulent strain of *Rickettsia rickettsi* from the Bitterroot Valley, Montana, U.S.A., a strain of Indian tick typhus and a strain of Russian rickettsialpox. All these strains multiplied in the mucous membrane of the mid-gut and in the haemolymph of the lice, but the number of rickettsiae passed out in the faeces remained small no matter what the method of infection. The strains differed in their pathogenicity for lice, and in their longevity, but none of them would grow for an indefinite period unless they had been transmitted by intracoelomic injections.

The strain of *R. rickettsi* could not be maintained in the mid-gut of lice for more than a few serial passages, and often did not survive a single transfer. This strain was markedly pathogenic for lice and closely resembled a strain of *R. rickettsi* from Mexico. A strain of *R. conori* from North Africa also showed the same pathogenicity for lice, but could be maintained in lice by serial passages for a prolonged time, in this respect differing from the rickettsiae of "maculatum disease" [see below].

A strain of Indian tick typhus showed a high rate of propagation in lice and low pathogenicity for its hosts. Similar properties were observed in two strains of *R. conori* from Kenya and South Africa, respectively, one strain of *R. rickettsi* from Brazil, two strains of Siberian tick typhus, and one strain of *R. australis* from North Queensland. All these strains had been maintained for long periods by serial passages in lice, with the exception of the Indian strain in which growth in lice had been interrupted several times. The strain of Russian rickettsialpox was characterized by its ability to multiply in lice at a high rate even when continually maintained in these arthropods. The lice could easily be infected by feeding on infected mice. This strain differed from an American strain of *R. akari* by its higher pathogenicity for lice.

The behaviour in lice of rickettsiae belonging to the spotted fever group showed only gradual differences and therefore its taxonomic value is limited. Nevertheless, the study of the behaviour in lice helps to supplement and verify our knowledge of the specific properties and interrelationships of rickettsiae among which *R. tsutsugamushi* and *R. quintana* occupy exceptional positions.

The behaviour of various strains of rickettsiae in lice is summarized in the following table:—

| *Disease and strain* | *Multiplication in stomach epithelium* | *Pathogenicity for lice* | *Multiplication in passage—louse to louse* |
|---|---|---|---|
| American spotted fever Michoacan (Mexico) | ++ | +++ | Limited |
| American spotted fever Bitterroot (U.S.A.) | ++ | +++ | Limited |
| American spotted fever Lebre (Brazil) | +++ | + | Somewhat limited |
| Maculatum disease | + | − | Limited |
| Boutonneuse fever (North Africa) | ++ | +++ | Unlimited |
| Kenya typhus | +++ | + | Unlimited |
| South African tick-bite fever | +++ | + | Unlimited |
| Indian tick typhus | +++ | + | Somewhat limited |
| Siberian tick typhus | +++ | + | Unlimited |
| N. Queensland tick typhus | +++ | + | Unlimited |
| Rickettsialpox Kaplan (U.S.A.) | ++ | + | Unlimited |
| Rickettsialpox, Russia | +++ | ++ | Unlimited |

[See also this *Bulletin*, 1958, v. 55, 746; 1959, v. 56, 291; 1960, v. 57, 1043.]

*Edward Hindle*

WEYER, F. Beobachtungen an einem Stamm von "Maculatum Disease". [**Observations on a Strain of Maculatum Disease**] Reprinted from *Pathologia et Microbiol.* Basle. 1961, v. 24, Suppl., 167–76, 6 figs.

The author has studied the behaviour in lice of a strain of rickettsia, related to *R. rickettsi*, isolated by PARKER *et al.* [this *Bulletin*, 1940, v. 37, 254] from ticks, *Amblyomma maculatum*, in Texas. Although morphologically similar to *R. rickettsi* this strain was found to differ serologically and immunologically and produced a distinct type of infection in guineapigs and rabbits to which the name maculatum disease was given.

The organism was transmitted to and multiplied in lice inoculated either into the stomach or haemolymph, and in its general behaviour resembled other rickettsiae. It multiplied readily in the haemolymph, but in the stomach mucosa the infection was localized and temporary and died out after a few passages. Unlike *R. rickettsi* it was completely non-pathogenic in lice. The strain was also grown in mealworms (the larvae of *Tenebrio*), in *Ornithodoros*, and in mice following intranasal or intraperitoneal inoculation. The results of the experiments confirm the antigenic relationship between the causative agents of Rocky Mountain spotted fever and maculatum disease but stress their individuality.

*Edward Hindle*

KULAGIN, S. M., TARASEVICH, I. V., RUBAKIN, P. E., NIKITIN, A. M. & KRUPINA, Z. N. **The Eradication of Marseilles Fever. Some Observations on Marseilles Fever in Sevastopol.** *J. Microbiol., Epidemiol. & Immunobiol.* London. 1960, v. 31, No. 8, 1526–31, 1 fig. [12 refs.] [Translated from Russian.]

Marseilles fever [fièvre boutonneuse] is endemic in Sevastopol, and this paper gives the results of studies carried out in 1958. Antibodies for *Rickettsia conori* were found in 4 out of 107 sera (3·7%) from healthy blood donors, in the sera of 18 out of 57 dogs (31·6%) from the town itself, and in the sera of 20 out of 83 dogs (24·1%) from the suburbs. *Rhipicephalus sanguineus* is commonly found on dogs in the town, the average number of ticks on the ears ranging from 34 in June to 300 and more in August; 5 out of 18 batches of ticks taken from dogs were found to be infected with rickettsiae which were identified as *R. conori*.

Measures for the eradication of the infection include registration of dogs, destruction of stray dogs and cats, and treatment of dogs and yards with DDT dust twice each month. *R. S. F. Hennessey*

BREZINA, R. & REHÁČEK, J. **A Study of the Phase Variation Phenomenon by Experimental Infection of the Tick** *Dermacentor marginatus* **Sulzer with** *Coxiella burneti*. *Acta Virologica*. Prague. 1961, July, v. 5, No. 4, 250–54. [18 refs.]

Transovarian and interstage transfer of *Rickettsia burneti* in *Dermacentor marginatus* was demonstrated by injecting a suspension of rickettsiae into the body cavity of female ticks and subsequently isolating *R. burneti* from larvae, nymphs and imagos of the 1st generation. Attempts to isolate rickettsiae from larvae of the 2nd generation were unsuccessful.

The Henzerling strain of *R. burneti* used for the infection of female ticks was in phase II, but strains recovered from instars, including unfed larvae, were all in phase I. No antibodies were detected in the sera of guineapigs on which the ticks of instars had fed, indicating that contact with antibodies may not be the only factor responsible for change of phase.

Strains isolated from tick instars multiplied poorly in yolk sacs and had low virulence for guineapigs. One of these strains (from imagos) underwent a marked increase in virulence between the 10th and 14th passage in yolk sacs, becoming more virulent than the original Henzerling strain.

*R. S. F. Hennessey*

DAITER, A. B. **The Bed Bug as a Possible Reservoir of** *Rickettsia burneti* **(Experimental and Epidemiological Findings).** *Problems of Virology*. London. 1960, v. 5, No. 5, 644–52, 3 figs. [15 refs.] [Translated from Russian.]

Guineapigs were infected intraperitoneally with two strains of *Rickettsia burneti* (Italian-Greek Greta strain and strain 422 isolated in Czechoslovakia). At the height of the infection bedbugs were fed on these animals and kept either at room temperature (16°–19°C.) or in an incubator at 30°–32°C. The

rickettsiae were found to persist in the bugs for periods up to at least 285 days in 46 out of 60 experiments, irrespective of the temperature, and maintained their virulence as shown by inoculation into mice and guineapigs. Moreover, the infection persisted through the various developmental stages and in 20 out of 30 experiments transovarian transmission was established; and the presence of the infection in the offspring of infected bedbugs was shown in both the first and second generations. The organisms multiply in the gut of the bedbug and may be excreted in the faecal matter.

An investigation of bedbugs collected in an endemic focus of Q fever resulted in the isolation of *R. burneti* in 2 instances and both strains, Cimex I-Luga and Cimex II-Luga, were passaged in guineapigs and adapted to growth in eggs. It is evident, therefore, that bedbugs must be considered as potential carriers of Q fever and it is necessary to extend the prophylactic programme against this infection to include compulsory disinsectization and disinfection of premises in which these insects are found. *Edward Hindle*

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## YELLOW FEVER

*In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

BAYER, M. E. & NIELSEN, G. Zur Morphologie des Gelbfiebervirus. (Kurze Mitteilung.) [**Morphology of Yellow Fever Virus**] *Arch. f. d. gesamte Virusforschung.* 1961, v. 11, No. 2, 303–6, 3 figs.

The English summary appended to the paper is as follows:—

"Yellow fever virus (Strain Asibi, tissue culture adapted) was cultivated on KB-cells and observed by electron microscope. The particles found intra- and extracellularly are suspected to be of spherical shape, 25–27 mμ in diameter. Both accordant light- and immunofluorescence microscopic results and neutralization reactions indicate viral specificity of the cytopathic effects."

[See this *Bulletin*, 1961, v. 58, 308, 309.]

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## DENGUE AND ALLIED FEVERS

WIEBENGA, N. H. **The Cultivation of Dengue-1 (Hawaiian) Virus in Tissue Culture. I. Carrier Culture of Human Skin Cells infected with Dengue-1 Virus.** *Amer. J. Hyg.* 1961, May, v. 73, No. 3, 350–64, 4 figs. [20 refs.]

————, with the technical assistance of I. E. FISHBURNE. **II. Cytopathogenic Virus subcultured from HuS 2806 Dengue-1 Carrier Culture,** *Ibid.*, 365–77, 5 figs.

I. High mouse passage Hawaiian dengue-1 virus was grown in a continuous cell line derived from human skin (HuS 2806). A carrier culture was established

by inoculating with about 1 mouse LD50 per 40 cells. This culture has been maintained by normal methods for 2 years without loss of infection. There was a gradual increase in infectivity for mice of the culture fluid from 1·0 log after 1 month to 5·5 log after 15 months. The identity of the carrier culture virus was confirmed. No alteration in cellular morphology occurred during this period except increased cytoplasmic basophilia in about 20% of cells in the infected culture. No evidence was found of a significant effect on cell multiplication. After medium change on the cultures, virus titres in the cell suspension were high (over 3·0 log) for about an hour then tended to fall, increasing again by 24 hours. If 10% ox serum ultrafiltrate was substituted for 10% horse serum in the medium, virus yield was unaffected at first but cell degeneration developed (but not in controls) within 2 days, increasing until 90% of cells had been lost by the 21st day. Passage of this material in normal cells failed to establish a cytopathic line of virus.

During the first 9 months of culture the virus was tested at intervals in human conjunctival, HeLa, HuS 2806, HuS 2544 and monkey kidney cells. Incomplete cytopathic changes were seen in monkey kidney cells after 12–18 days but no change in the other cell lines. After 15 months' chronic infection the virus yield caused cytopathic changes in 5–8 days in HuS 2806 and in monkey kidney with normal media: this property was maintained through 10 serial passages.

Carrier cultures were studied by indirect fluorescent antibody staining: specifically stained amorphous masses were seen in the cytoplasm of at least 10% of the cells. Staining of cultures chronically infected with Japanese encephalitis virus and of dengue-1 infected cultures with dengue and Japanese encephalitis antibody showed that cross reaction occurred but that the extinction titres of homologous antibody were much higher than of heterologous antibody.

II. The cytopathic variant derived above was further studied. The changes in HuS 2806 cells involved all but a few cells within 5 days and were not reversible by changing the medium. The changes in monkey kidney cells were focal: clusters of large spherical cells appeared in about 5 days and these were later shed to leave clear areas which were grown over by surviving cells. Secondary or tertiary monkey kidney cultures exhibited very little change although virus multiplied in them equally well. The infective dose for suckling mice, HuS 2806 and monkey kidney cells appeared to be about the same. Maximum infectivity titres in tissue culture were found to require at least 10 hours' contact between inoculum and cells. In both types of cell the infectivity fell rapidly after inoculation to an undetectable level: by 24 hours the titre was about 2 log and a maximum of 4–5 log was reached in about 80–100 hours. When the medium was changed at 76 hours the maximum titre was reached about 20 hours earlier. Neutralizing indices determined in these cell lines were similar to those obtained when mice were used. Fluorescent antibody staining gave similar results to those reported above. *C. E. Gordon Smith*

## RABIES

THIODET, J., MASSONNAT, J., FOURRIER, A., BENSAID, J. & GENIAUX, M. Considérations sur 25 cas de rage humaine déclarée observés en cinq ans. Tentatives thérapeutiques. [**Therapeutic Trials in 25 Cases of Human Rabies seen in 5 Years**] *Algérie Méd.* 1960, Nov., v. 64, No. 11, 919–26, 1 fig. [21 refs.]

See also this *Bulletin*, 1961, v. 58, 1008.

EL-HAWARY, M. F. S. & HASSAN, Fatma. **Electrophoretic Studies on Serum Proteins after Antirabies Vaccine Administration.** *J. Trop. Med. & Hyg.* 1961, May, v. 64, No. 5, 121–5, 2 figs. [11 refs.]

The serum proteins of 22 subjects undergoing a course of injections of sheep-brain rabies [presumably phenolized, Semple-type] vaccine, were estimated by the method of GREENBERG (*J. Biol. Chem.*, 1929, v. 82, 545) and by electrophoresis. In 12 a new protein band, called beta 1, with a mobility faster than the gamma globulin and beta globulin and slower than the alpha-2 globulin showed itself in the electrophoretic pattern during treatment; there was a parallel decrease in the level of alpha-2 globulin. In the other 10 subjects the beta 1 fraction did not appear at all during the 21 days of immunization, but there was a " marked " increase in the alpha-1 and alpha-2 globulins. Sera taken a few days before death from 4 fatal cases of rabies also showed the new protein band [but Table IV gives these results as having been obtained shortly *after* death].

The authors assume [one wonders why] that this parallelism between serum protein variations in immunized subjects and rabies patients supports the view that these variations are due to antibody formation and not to the proteins injected. *D. A. Cannon*

HUMPHREY, G. L., DEAN, B. H. & MERRILL, M. H. El programa de control de la rabia del Estado de California, Estados Unidos. [**Rabies Control Programme in California**] *Bol. Oficina Sanitaria Panamericana.* 1961, Apr., v. 50, No. 4, 289–304, 1 map. [21 refs.]

Rabies has been known in California since at least 1836, but the first laboratory confirmation in a dog was in Los Angeles in 1898 and in a human being in Pasadena in 1899. In 1909 a serious outbreak occurred in dogs in Los Angeles and this seems to have been the starting point of an epizootic which spread through most of the state between 1910 and 1915, when 930 cases were recorded in animals, mostly dogs. The first outbreak in feral animals was recorded in 1913 when rabies was confirmed in a coyote and an extensive outbreak in these animals took place in north-east California between 1915 and 1917 as part of a great epizootic which also involved the neighbouring states of Oregon, Nevada, Idaho and Utah. The year 1918 saw the end of a cycle of spread and diminution of animal rabies in California, but a second cycle occurred between 1919 and 1951. The increase took place irregularly until in

1937 there were more than 2,000 cases, mostly in dogs. Thereafter there was a fluctuating decrease, culminating with 54 cases in 1951, the lowest since 1918. Between 1922 and 1951 there were more than 20,000 cases with over 97% in dogs. During the whole period, human cases were usually less than 3 per year (except in 1923, when there were 11 cases) and from 1945 onwards there were either 1 or no human cases per year. All these figures are shown in a table.

Today, rabies in California is a problem of feral animals, affecting 40 of the 58 counties in 1948. Since 1950 there has been a notable increase in the number of cases recorded in feral animals, especially skunks: in 1954, 44 of 85 cases were in wild animals.

In 1955 the State Department of Public Health set out a programme to delineate endemic areas and to encourage vaccination of dogs, and to introduce quarantine measures. In 1957 State regulations were introduced to implement these measures and the provisions are discussed at length. They included licensing and vaccination of dogs and the provision of official kennels. These programmes were not carried out equally in every area and in 1958 the public health authorities revised their regulations: this is discussed fully and it is noted that the issue of a licence was now subject to previous vaccination of the dog. The difficulties of application of the new laws are discussed and these included the multiplicity of local agencies concerned.

Between 1955 and 1959 some 1·8 million doses of canine anti-rabies vaccine were distributed and vaccination of 735,034 dogs was notified. As a result, canine rabies fell to a low level. Except for an outbreak in Monterrey (21 cases) in 1959 and another in Imperial County (29 cases) in 1959, the number of cases in dogs in zones where sylvan enzootics occurred, between 1956 and 1959, were 7, 5, 4 and 5. The value of the measures carried out is discussed.

[See also this *Bulletin*, 1961, v. 58, 440.] *H. J. O'D. Burke-Gaffney*

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## PLAGUE

*In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.*

Pirt, S. J., Thackeray, E. J. & Harris-Smith, R. **The Influence of Environment on Antigen Production by *Pasteurella pestis* studied by means of the Continuous Flow Culture Technique.** *J. General Microbiol.* 1961, May, v. 25, No. 1, 119–30, 4 figs. [18 refs.]

The difficulties of preparing a series of suspensions of *Pasteurella pestis* of the same antigenic constitution and virulence by the batch culture method are well recognized [see Buckland and Treadwell, this *Bulletin*, 1961, v. 58, 1130, and also Crumpton and Davies, *ibid.*, 1956, v. 53, 989]. Different antigens may be produced at different stages in batch culture, but in continuous flow culture it is possible to select a particular environment and maintain it indefinitely so that antigen production should be constant, though not necessarily optimal,

because all the antigens may not be produced at once in a single environment. The introduction of a multi-stage process (CALLOW and PIRT, 1961, in the press) provides a way out of this difficulty. The present paper is concerned with the yields of 3 of the antigens of *P. pestis* (fraction 1, antigen 4 and the V antigen) in continuous flow culture over a range of temperatures and *p*H values. The production of these antigens has been determined quantitatively, but the production of some of the other antigens has only been followed qualitatively. For example, at 37°C. the production of fraction 1, the V antigen and antigen 4 was maximal, while at 28°C. the production of these antigens was practically nil.

Antigen 4 is considered to be important in mouse immunity experiments with the living Tjiwidej smooth cultures of *P. pestis*. The present observations indicate that a *p*H value below 6·9 is essential for the production of antigen 4. If the production of immunity by this living culture of relatively low virulence involves some *in vivo* development of antigen 4 it must mean that the organism itself finds some way of providing an environment, or some other means whereby conditions are suitable for the development of antigen 4.

A further point of interest concerns the selective action at 37°C. of organisms without fraction 1 over those containing fraction 1 which seems to be associated with the loss of virulence of *in vitro* cultures grown at 37°C. [this *Bulletin*, 1933, v. 30, 527].

[This is an extremely interesting paper and should be read in conjunction with the several other communications from this group of workers at the Microbiological Research Establishment at Porton.] *H. J. Bensted*

FURMAN, D. P., QUAN, S. F., KARTMAN, L. & PRINCE, F. M. **Experimental Attempts to transmit *Pasteurella pestis* with the Mite *Haemogamasus liponyssoides hesperus* Radovsky (Acarina: Haemogamasidae).** *Amer. J. Trop. Med. & Hyg.* 1961, July, v. 10, No. 4, 551–5.

"*Haemogamasus liponyssoides hesperus* Radovsky, a parasitic mite commonly taken from nests of meadow mice, was tested in the laboratory on the hypothesis that it might play a role in the maintenance of plague in nature. Techniques for forced feeding and external decontamination of the mites were developed. Mites fed well on healthy suckling mice and on heparinized blood from healthy mice, but fed poorly on suckling mice suffering a terminal bacteremia with *Pasteurella pestis* or on plague-bacteremic blood. Viable *P. pestis* were demonstrated to survive in the mites up to 23 but not to 24 hours following an infective blood meal. Bacterial culture of triturated mite suspensions proved less reliable in demonstrating the presence of viable *P. pestis* than did animal inoculation. Mites which had fed on an infectious blood source failed to transmit the infection by feeding upon suckling laboratory mice.

"Results of the experiments do not support the hypothesis that the mite may be of significance in the maintenance of plague in nature."

SMITH, D. A. **Absence of Lysogeny in *Pasteurella pestis*.** [Correspondence.] *Nature*. 1961, July 29, v. 191, 522–3. [10 refs.]

## CHOLERA

*In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.*

South-East Asia Treaty Organization & Nat. Insts. Health, Pub. Health Service. **Conference on Cholera, held in Dacca, East Pakistan. December 5–8, 1960.** *Pub. Health Rep.* Wash. 1961, Apr., v. 76, No. 4, 323–34.

The complete proceedings of this conference will be published in due course and the present report represents summarized accounts only of the main business of each of the various sessions, which considered clinical manifestation and management, physiological changes in cholera, pathology and pathogenesis, vaccines and immunity, epidemiology and laboratory identification of cholera vibrios. The United States was strongly represented and there were active participants from Pakistan, as the host country, and also from Thailand. There were delegates from Great Britain, France and Japan. It is not quite clear from this report whether India actually participated or not.

The discussions on the physiological changes in cholera were mainly concerned with the water and electrolyte loss in the light of a histologically intact intestinal mucosa. Much appears to have been said about the value of prophylactic vaccines, but nothing very helpful. All the speakers seem to believe that vaccination had some protective effect, yet agreed that there was no reliable method for the assessment of potency of cholera vaccines short of a properly controlled field trial but that there was little likelihood of such a trial being organized, at any rate in the near future.

There was a useful discussion on the laboratory identification of cholera vibrios. There is no doubt that further divisions of the main sub-species of *Vibrio cholerae* can be demonstrated but there are too many gaps in our knowledge at present to show how important are these minor differences and whether they are of value in epidemiological studies. *H. J. Bensted*

Mukerjee, S. **Host-Range of Cholera Bacteriophages other than the *Vibrio cholerae*.** *Ann. Biochem. & Exper. Med.* Calcutta. 1960, Nov., v. 20, No. 11, 317–26. [25 refs.]

The 4 groups of cholera bacteriophages [this *Bulletin*, 1958, v. 55, 651] were tested against the following strains: 43 pathogenic strains of El Tor vibrios from Indonesia, 7 other strains of El Tor vibrios from Calcutta, 29 non-agglutinating (NAG) vibrios from various sources in Calcutta, 78 strains of *Escherichia coli* isolated from cholera patients in Calcutta and 25 strains of enteropathogenic *E. coli*.

Although a significant number of the NAG vibrios shared H antigens with *Vibrio cholerae*, none possessed their O antigens. A few strains showed varying degrees of sensitivity to the cholera phages of groups III and IV but they were universally insensitive to the group II phages.

El Tor vibrios with the same antigenic structure as *V. cholerae* and only differing in the production of haemolysin, were universally resistant to the group IV phages, while this group was regularly lytic for *V. cholerae*.

Some of the *E. coli* strains were antigenically related to *V. cholerae*, possibly through common minor antigens, but in no case was there any evidence of susceptibility of the coli strains to the *V. cholerae* phages.

*H. J. Bensted*

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## AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

*In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.*

ENTNER, N., with the technical assistance of L. A. EVANS. **Genetics of *Entamoeba histolytica*: Initial Experiments.** *J. Protozoology*. Utica. 1961, May, v. 8, No. 2, 131–4.

Experiments described in this paper were carried out in an attempt to detect hereditary characters in *Entamoeba histolytica*. Since the presence of other living cells in cultures of this amoeba preclude the study of their nutritional requirements and metabolism, attention was directed only to their sugar consumption and response to drugs.

Attempts to detect spontaneous mutation in cultures treated with a lethal drug and to induce the production of drug-resistant mutants by exposure to ultraviolet rays failed. The effect of Actidione, Mantomide, carbarsone, fumagillin and emetine and the utilization of various sugars proved to be of the same order in all the six strains of *E. histolytica*. *C. A. Hoare*

KESSEL, J. F., LEWIS, W. P., MA, S. & KIM, H. **Preliminary Report on a Hemagglutination Test for Entamoebae.** *Proc. Soc. Exper. Biol. & Med.* 1961, Feb., v. 106, No. 2, 409–13. [15 refs.]

Owing to unsatisfactory results obtained in serological tests on amoebiasis with antigens of *Entamoeba histolytica* grown in culture with concomitant bacteria, the authors sought to improve the specificity of the amoebic antigens by using cultures grown with *Trypanosoma cruzi*. In addition to *E. histolytica*, the reptilian parasite *E. invadens* was used in the haemagglutination test employed in this work. Antisera were prepared in rabbits inoculated with entamoebae grown with *Aerobacter aerogenes* and washed free of the bacteria. Antigens were produced from cultures of entamoebae grown with *T. cruzi*, which was removed by centrifugation, leaving only amoebae in the sediment. These were suspended in distilled water and ruptured by vigorous passage through a 20-gauge needle, after which isotonicity was restored by addition of saline to the extract. The resulting solution provided stock antigen diluted to 1 in 20. For the test, a modification of Boyden's tanned cell haemagglutination technique [*Bull. Hyg.*, 1951, v. 26, 562] was employed.

In practically all the tests, the two entamoebic antigens reacted positively

with the homologous antisera, only an insignificant number reacting with the heterologous ones. In the case of *E. histolytica*, sera were tested from persons whose stools showed no parasites, from those with symptoms of diarrhoea or dysentery and amoebae in the stools, from those with amoebic liver abscess, and from carriers. Varying degrees of haemagglutination were observed in clinical and carrier cases of amoebiasis (total 98% and 68% positive respectively), whereas among controls only one person—who had travelled in the tropics—reacted positively.

There was a clear correlation between complement-fixation and haemagglutination tests. *C. A. Hoare*

Kapoor, O. P., Shah, N. & Billimoria, B. R. **Pleuropulmonary Amoebiasis complicating Liver Abscess.** *J. Indian Med. Ass.* 1961, June 1, v. 36, No. 11, 506–8, 510–12, 10 figs. on 3 pls.

The authors, in Bombay, have seen 10 cases of pleuropulmonary amoebiasis secondary to amoebic liver abscess. They say that the literature on the subject is scanty and that the complication is rarely seen in temperate climates. They analyse the symptoms and signs in their patients and discuss the procedures which will help in diagnosis. There are some good illustrative X-ray reproductions. In treatment they advocate emetine or choroquine, and also broad spectrum antibiotics of which they mention chlortetracycline as an amoebicidal drug. Repeated aspiration is deemed important, and they discuss the indications for active surgical interference including even lung resection.

[Within the abstracter's personal experience pleura and lung involvement by an amoebic liver abscess unfortunately is by no means rare even in the temperate climates. It is primarily dependent on the location of the liver lesion and its duration before specific treatment.] *A. R. D. Adams*

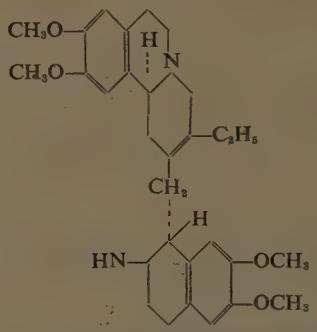
Blanc, F., Nosny, Y., Armengaud, M., Sankale, M., Martin, M., Charmot, G. & Nosny, P. La 2-déhydro-émétine dans le traitement de l'amibiase. [**2-Dehydro-Emetine in the Treatment of Amoebiasis**] *Bull. Soc. Path. Exot.* 1961, Jan.–Feb., v. 54, No. 1, 29–38. [10 refs.]

Of the steadily increasing number of drugs employed for the treatment of amoebiasis only emetine and conessine, both of which are diffused in the blood, are specifically amoebicidal in that they destroy amoebae located in any tissue of the body. Their use, unhappily, is restricted to treatment of the acute disease owing to the serious side effects they may cause. The 4-amino-quinolines and aminoacridines can act only in the liver, where they are concentrated. The oxyquinolines, arsenicals of various types and other compounds used in treatment of amoebiasis are amoebicidal solely on contact with the parasites within the bowel; they commonly are misused by reason of failure to appreciate this limitation. The antibiotics are not amoebicidal, and their effect on the parasites is consequent on their action on the associated bacterial flora.

Emetine is one of the most remarkable drugs in the pharmacopoeia: it is very actively amoebicidal, very freely diffused by the circulation, and only

very slowly excreted through the kidneys. Conessine, which has enjoyed periodic favour, possesses no advantage over emetine and its toxic action is neurological and psychological, so again it is falling into disfavour.

Emetine recently has been synthesized and a series of related synthetic compounds are available. Of these a 2-dehydro-emetine (DHE) has been tested therapeutically by the authors. The graphic formula of this particular compound, 2,3-*bis* dehydro-emetine hydrochloride, isomer II, is as follows:—




DHE is a white, colourless crystalline substance with a bitter taste; its solubility is 10% at 20°C.; it kills *Entamoeba histolytica* in culture at a concentration of 10 mgm./litre, and in this it parallels emetine. For amoebiasis in rats the curative dose is 1·25 mgm./kgm. and the lethal dose 36·3 mgm./kgm.—a therapeutic index of 29. For emetine, the figures are 7·8, 27·5 and 4·8. DHE has proved as therapeutically active in rats at one-sixth of the dose; the toxic dose was similar to that of emetine. In mice the toxicity of DHE is half that of emetine, by whatever route the drugs are given. Emetine and DHE given by mouth to rats at a level of 3 to 4 mgm./kgm. daily for 12 weeks caused death within 2 weeks of all 10 of those given the first drug; but 9 of the 10 given DHE survived without evidence of toxicity other than slight swelling of the liver and of the myocardium, and some stunting of growth. Detailed pharmacological studies were undertaken on cats and rabbits [the results are reported] before DHE initially was given to 20 patients with hepatic amoebiasis. The dosage was 60–80 mgm. given over 10 days; the results were those expected of emetine treatment in this condition. Subsequently 134 patients in France or Senegal, all suffering acute liver or bowel manifestations of amoebiasis, were treated with DHE; the usual gross dosage was 0·01 gm./kgm. body weight; this proved effective though in some grave hepatic cases a considerably larger dosage was given.

The patients treated with DHE have been broadly grouped according to the clinical picture and their responses have been analysed. Intramuscular injection of this drug caused local pain, but this was obviated by giving the injection subcutaneously. Other side effects were trivial; biochemical, electrocardiographic and electroencephalographic examinations showed little or no changes resultant on its use. DHE thus proves to be a valuable specific amoebicide possessing the virtues of emetine but devoid of its toxicity; it may prove to be the greatest advance in the therapy of amoebiasis since the introduction of emetine itself in 1912. *A. R. D. Adams*

SCHWARTZ, D. E. & RIEDER, J. Comparaison de la vitesse d'élimination de la 2-déhydro-émétine Rac. (= Ro 1-9334) et de l'émétine naturelle chez l'animal. [**Comparison of the Speed of Elimination of 2-Dehydro-Emetine and of Emetine in Animals**] *Bull. Soc. Path. Exot.* 1961, Jan.–Feb., v. 54, No. 1, 38–48, 2 figs.

An explanation of tolerance of 2-dehydro-emetine (DHE) superior to that of emetine may lie in its more rapid excretion. Studies to determine this were made on rabbits and guineapigs submitted to one or other of the drugs by intra-arterial or intraperitoneal injection. The concentration of the drug was determined in the plasma or in the whole body and in the heart and in the liver at suitable intervals by a spectro-fluorimetric technique, details of which are given in the text.

The concentration of either drug in the plasma of rabbits after intracarotid injection was found to fall in a comparable manner over a period of 2 hours, that is rapidly in the first 30 minutes and then more slowly. Intraperitoneal injection of the drugs into guineapigs showed the disappearance of DHE from the whole body to be more than twice as rapid as that of emetine; while emetine had a half-life of 5·27 days, that of DHE was only 2·22 days. In the liver the comparable period for emetine was 4·16 days and that for DHE 1·72 days; and the concentration of both drugs in this organ was high. In the hearts of animals treated with either drug the concentration was no greater than that in the whole body. The superior tolerance of DHE over that of emetine therefore in fact does lie in its more rapid elimination and hence its lesser concentration in tissues throughout the body. *A. R. D. Adams*

BERNER, A. Protozoolytische Stoffe eines neuen Sporenbildners *Bacillus carmel*. [**Protozoolytic Substances of a New Sporulating Species** *Bacillus carmel*] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1961, Feb., v. 121, No. 1, 91–4.

The author describes the effect upon protozoa of a new antibiotic obtained from *Bacillus carmel* n.sp., which was isolated from pus, gall bladder and ducts in the course of cholecystectomy. The new organism is characterized as follows: non-motile Gram-variable short rods; when grown on glucose-agar forms filaments; aerobe; grows well on standard media, especially potato, at 30–37°C. (*p*H 4·8–5·2); after cultivation for 3 days produces an oval central spore; haemolyses blood-agar and liquefies Dorset egg media; indol-negative, catalase-positive; produces acid without gas when grown with glucose, mannitose and xylose, but does not ferment lactose, saccharose or arabinose; reaction with galactose and glycerol varies.

The antibiotic is obtained by growing the strains for 6 days on solid potato-medium, after which the organisms are washed off with N/100 HCl solution, left for 3 days at room temperature, and autoclaved for 20 minutes at 120°C. The solution is then allowed to stand for another 4 days, when it is neutralized. The resulting suspension contains a mixture of water-, ethyl- and butyl-alcohol-soluble polypeptides, representing the active agent.

The new antibiotic inhibits the growth of Gram-positive cocci, but has no effect upon enterobacteria. However, its effect upon protozoa is more pronounced. Thus, when added to cultures it has a lytic effect on *Paramecium* and on *Entamoeba histolytica*, all the amoebae being killed by the antibiotic in

dilutions up to 1:200, while a few survive in dilutions up to 1:1,000, and about a half at 1:2,000. Tests on mice showed that feeding them daily with $5 \times 10^9$ living bacilli and subcutaneous inoculation of $10^9$ organisms had no harmful effect on these animals.

It is suggested that the new antibiotic might be used in the treatment of amoebiasis.

[See also this *Bulletin*, 1961, v. 58, 916.] *C. A. Hoare*

MAGAUDDA-BORZÌ, L. & PENNISI, L. Le prove di amebicidia *in vitro*. Rassegna critica e proposta di una metodica standard. [**Amoebicidal Tests** *in vitro*. **A critical Review and a Suggested Standard Technique**] *Riv. di Parassit.* Rome. 1961, Mar., v. 22, No. 1, 55–74. [Numerous refs.]

Ideally, an amoebicidal drug should combine effective action against amoebae, reaching the parasite in other organs and tissues beyond the intestine when necessary, with complete harmlessness to the host. The authors refer briefly to the findings of other workers who have been screening a wide variety of substances for amoebicidal properties, comment on the possible reasons for apparent discrepancies in results, and discuss the factors which are concerned.

They then lay down a number of requirements for achieving a standard technique to give comparable results, thus:—

(1) at least 2 known amoebicidal substances, *e.g.* emetine, chlortetracycline, chloroquine, should be used as controls;

(2) at least 4, recently isolated, strains of *Entamoeba histolytica* should be tested;

(3) these strains should be tested in association with *Trypanosoma cruzi* or with a single bacterial species which is known to be resistant to the substance which is being screened;

(4) the culture medium should be monophasic and as simple in composition as possible, such as Locke's solution 7 parts with 1 part of inactivated horse serum and traces of deproteinized rice;

(5) the testing should be carried out under both aerobic and anaerobic conditions.

They suggest the adoption of a temperature of 37°C. and a time of 48 hours as uniform conditions for these screening tests; the inocula should carry at least 100,000 organisms per cc. per tube and the *p*H value of the medium should be controlled. Subcultures must be made to confirm results. *J. Cauchi*

GAMONDI, P. Alcune osservazioni e ricerche sopra la *Hartmanella castellani* (*Amoeba castellani*, *Acanthamoeba castellani*). [**Studies on** *Hartmanella castellanii*] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1961, July, v. 42, No. 7, 351–62. [17 refs.]

RUIZ, A. *Entamoeba moshkovskii* Tshalaia, 1941 en Costa Rica. [*Entamoeba moshkovskii* **in Costa Rica**] *Rev. Biologia Trop.* San José, Costa Rica. 1960, Dec., v. 8, No. 2, 253–61, 12 figs. on pl. [16 refs.] English summary (9 lines).

The free-living *Entamoeba moshkovskii*, which is morphologically indistinguishable from *E. histolytica* and other parasitic entamoebae with quadrinucleate cysts, has hitherto been isolated in culture from sewage effluents in Russia, England, Central Asia, North America (Canada, New Jersey, California) and Brazil. In the present paper, the author reports the finding of this amoeba in sewage digestion tanks of the City of Cartago in Costa Rica. In discussing the structure, bionomics and affinities of this organism, the author concludes that it is not a free-living phase of any parasitic entamoeba but a valid independent species.

The appearance of *E. moshkovskii* is illustrated in a plate of photomicrographs. *C. A. Hoare*

Steck, F. Amoebendysenterie bei Reptilien. [**Amoebic Dysentery in Reptiles**] *Zent. f. Bakt.* I. Abt. Orig. 1961, v. 181, No. 4, 551–3. [11 refs.]

In the course of autopsies carried out by the author on lizards and snakes from two vivaria in Switzerland, 5 animals (*Iguana iguana, Crocodilurus lacertinus, Eryx johnii, Boa constrictor* and *Epicrates striatus*) were found to be suffering from amoebiasis due to infection with *Entamoeba invadens*. Cultures of the amoeba, isolated from *Crocodilurus*, produced infection in water snakes (*Natrix maura*), which died 11–14 days later, while a number of normal snakes kept in the same cage became infected from the others. On the other hand, no spontaneous amoebiasis was detected in water snakes (*N. maura* and *N. natrix*) from Switzerland and Spain which had not been in contact with infected reptiles.

In the infected reptiles histopathological changes were found chiefly in the colon and liver. The colon showed necrotic, haemorrhagic and diphtheroid lesions, containing amoebae. The liver was enlarged and had necrotic foci with leucocytic infiltration, while the amoebae were restricted to spaces between the tissues. *C. A. Hoare*

Bocian, J., Prażanowski, M., Wawrzynska, Jadwiga & Stasik, M. Przypadek dyskastlozy o obrazie anemii Addison-Biermera w przebiegu lambliozy. [**A Case of Blood Dyscrasia with Symptoms of Addison-Biermer's Anaemia in the Course of Giardiasis**] *Wiadomości Parazytologiczne*. Wrocław. 1961, v. 7, No. 3, 579–85. [17 refs.] English summary.

Schneider, J. Traitement de la giardiase (lambliase) par le métronidazole. [**Treatment of Giardiasis with Metronidazole**] *Bull. Soc. Path. Exot.* 1961, Jan.–Feb., v. 54, No. 1, 84–95. [10 refs.]

Mepacrine was the first drug found to be therapeutically effective in giardiasis. It has variously been claimed to eradicate the infection from 74% to 90% of patients treated with it. Simultaneous treatment with Rodoprequine is said to enhance its efficacy. Sontochin has been shown to possess an activity against this parasite comparable to that of mepacrine. Chloroquine also is active, though it is curative in only 50% to 54% of those treated. The author's own experience has given a success rate of 55% to 70% either with mepacrine or

combined mepacrine/Rodoprequine treatment; repetition of treatment after 2 or 3 weeks has raised the figures for his cure rate to 75–80%.

A derivative of imidazole—metronidazole (1-β-hydroxy-ethyl-2 methyl-5 nitro-imidazole)—has been successfully used in *Trichomonas vaginalis* infections [*Bull. Hyg.*, 1961, v. 36, 146 *ter*]. Given orally it is absorbed from the small bowel and excreted in the urine. The author has treated patients harbouring *Giardia* infections with this drug. The dosage he employed was 0·5 gm. daily for 5 days; side effects were negligible in all but 3 patients. These suffered from digestive disturbances, one of them severely. Clinical accounts of 27 of these patients are detailed. Of these 24 appeared promptly to be relieved of their infections. 14 of them were followed up for 1 to 2 months without evidence of persistence of the infection in any but one of them in whose stools parasites reappeared. Repetition of the treatment in this case resulted in their apparent disappearance. Some patients in this group have now been observed regularly for periods of up to 5 months without reappearance of parasites in the stools.

Among the 13 remaining patients of the 27 under consideration there were another 3 known failures to eradicate the infection. In the first of these, parasites continued to be passed at the end of the treatment and the patient was not seen subsequently. In the second the patient after several unsuccessful varied treatments was given a couple of courses of metronidazole, at an interval of 8 days, and these were equally unsuccessful; subsequent re-treatments possibly may have effected a cure. In the third a patient was counted as a failure, because combined treatments for amoebiasis and for the giardiasis caused such vomiting and abdominal pain as to amount to an intolerance of the medication.

The therapeutic activity of metronidazole in giardiasis is considered by the author to be at least equal to that of mepacrine and probably superior to it; the drug as a rule is well tolerated. *A. R. D. Adams*

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## LEPROSY

*In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.*

LEIKER, D. L. De lepra-situatie in Nederland. [**Leprosy in the Netherlands**] *Nederl. Tijdschr. v. Geneesk.* 1961, Mar. 25, v. 105, No. 12, 567–71. English summary.

Until the end of the Second World War leprosy was an unimportant disease in the Netherlands, at which time there was a greater influx of people from endemic areas. Since 1950, of the 264 patients attending the Gastmann Wichers Foundation there were 157 Indo-Europeans, 48 Netherlanders, 35 Indonesians,

16 of mixed Indonesian and Netherlands parentage, 4 Surinamese and 4 Chinese. 238 of these patients had been infected in Indonesia, 22 in West Indies, and one each in Singapore, Hong Kong, Nyasaland and Brazil. It is possible that a number of the patients contracted the disease in concentration camps. Men out-numbered the women in all groups. Of 32 patients, 6 were missionaries, 4 teachers, 4 officials, 2 nurses, 1 policeman, 1 journalist, 1 salesman, 1 mechanic, 5 students, 2 housewives and 5 others. In the families of the patients who came yearly to the Gastmann Wichers Foundation 2 new cases in each of 25, 3 in 8, and 5 in 2 families were found and there were 4 conjugal infections. There were 84 cases of leprosy in these 35 families. About one-third of the patients were found in families in which more than one person had leprosy.

It is difficult to assess where the disease was contracted as in many cases the illness was far advanced without the patient noticing symptoms, but the majority developed symptoms within 5 years of coming to the Netherlands. In the Netherlands there are no isolation facilities for leprosy patients. A small number voluntarily attend a sanatorium on either social or medical indications but only a few have positive bacterial smears. The author briefly describes 9 cases and concludes that none of these patients contracted leprosy in the Netherlands and that in none of the cases of leprosy diagnosed in the Netherlands during the past 10 years had the disease been contracted there.

*Anne Tothill*

DEVIGNAT, R. **Multiplication of Hansen's Bacillus in Complex Symbiosis** *in vitro*. [Correspondence.] *Nature*. 1961, May 27, v. 190, 832.

This allegedly successful cultivation of *Mycobacterium leprae* followed a chance observation during an attempt to grow the organism in a culture of *Entamoeba terrapinae*. A fragment of leproma had been in buffered saline for 8 days at 25°C. and then transferred to a medium consisting of powdered skimmed milk, whole egg and reductase. After several weeks at 25°C. stained films revealed the presence of numerous bundles of granular, acid-fast bacilli resembling typical globi. As these bacilli were present in only 1 of 3 cultures from the same leproma, differences in the contaminating flora were considered as the possible cause of the variation; the tube in which the acid-fast bacilli were present contained 1 species of *Bacillus*, another of *Neisseria* and 2 of *Clostridium*.

The procedure with slight modifications was repeated with a leproma from the original patient and lepromata from 2 other patients. These cultures were infected with the contaminants of the original culture and in each acid-fast bacilli were again present; the author, for reasons unstated, considered the strain of *Bacillus* sp. to be the organism responsible for making the conditions suitable for growth of *Myco. leprae* [the identity of which the author apparently readily accepts]. In the primary cultures the numbers of acid-fast bacilli seemed to fluctuate, and they were mainly present on the surface. Secondary cultures were obtained in the original medium, or on agar media of various composition but containing malachite green, by using a heavy inoculum. [The author gives no description of this surface growth.] Tertiary cultures were unsuccessful.

*S. R. M. Bushby*

JAYARAJ, A. P. & CHAUDHURY, D. S. **Studies on the Neuro-Histological Changes in the Meissner Corpuscle in Leprosy.** *Leprosy Review*. 1961, July, v. 32, No. 3, 153–7, 12 figs.

The 12 figures given by the authors in this study are very useful and informative as to the histological findings. They took pieces of skin from the distal pad of the fingers of 24 patients showing typical lesions of leprosy. There were no visible lesions anywhere on the finger pads. There were 14 lepromatous and 10 tuberculoid cases, the type being confirmed by biopsies. It was found that the terminal fibres in Meissner corpuscles undergo characteristic changes in leprosy. In early lepromatous leprosy abundant bacilli occur alongside of the ramification of the nerve fibrils and the corpuscles look almost normal, but in advanced lepromatous leprosy bacilli are not found in the Meissner corpuscle and the corpuscle appears slightly damaged. In tuberculoid leprosy naked fading filaments are commonly found in the corpuscle. The papilla that occupies the corpuscle is compressed causing severe damage to the corpuscle. There is fragmentation of the ascending stem fibres which reach the papillae. In lepromatous leprosy the Meissner corpuscles tend to regain their structural and functional status, and the possibilities of this are far less in tuberculoid leprosy.

*J. R. Innes*

BECKER, C. K. & BRIEGER, E. M. **Organ Culture Method of producing a Leprosy-Bacillus Suspension (Nimorpel) for use as a Lepromin.** *Internat. J. Leprosy*. Wash. 1960, Oct.–Dec., v. 28, No. 4, 441–3.

The lepromin-type antigen obtained by this method consists of a suspension of leprosy bacilli from explants of human biopsy material maintained in culture for 5–6 weeks; the authors are suggesting the name Nimorpel for the antigen.

The biopsy material, after being cut into small cubes of 1–3 cmm. volume and washed in Tyrode or Hanks solution, was treated by one of two methods. The pieces of tissue were either transferred to rayon strips 1 cm. square, which were placed on clots of chicken embryo extract and plasma in watch glasses in Petri dishes, and transferred to fresh clots twice weekly ; or, in the alternative method, the pieces were placed on lens paper on a platform of tantalum wire mesh, and the fluid nutrient medium added to the level of the lens paper; in this method the medium was either serum-embryo-extract medium or 2 parts serum + 1 part of solution of 0·6% glucose and 0·2% NaCl, and it was changed twice weekly.

After 4–6 weeks' incubation the leprosy bacilli were practically free from tissue, at which stage the explants were crushed and squeezed by means of a glass rod through a fine-mesh nylon cloth spread across a glass funnel, saline being poured over the tissue. While this was being done, the numbers of bacilli were then adjusted to the required strength, and after adding 5% phenol and ampouling, the suspension was sterilized by autoclaving. *S. R. M. Bushby*

TAYLOR, C. E., HANKS, J. H. & KANT, L. **The Effect of Partial Purification of Lepromin on the Fernandez- and Mitsuda-Type Responses in Guinea-Pigs.** *Internat. J. Leprosy*. Wash. 1960, Oct.–Dec., v. 28, No. 4, 423–7, 1 fig.

Guineapigs were sensitized by monthly intradermal injections of 0·1 ml. of lepromin made by Wade's method, and at the time of the 6th injection the animals were tested with lepromin (Wade), autoclaved human skin antigen, and with 2 purified suspensions of *Mycobacterium leprae* from autoclaved leproma [this *Bulletin*, 1960, v. 57, 251]. One of these latter antigens was purified by differential centrifuging of bacilli declumped with chloroform, and the other by treatment with bile salts and pancreatin at *p*H 7·8 for 30 minutes at 37°C.

The reactions to the lepromin reached maximal sizes after the 3rd injection, the early reaction averaging 7–10 mm. during the first 2 days, then decreasing to a level of about 3 mm. for the next 2–3 weeks; bimodal responses with reduction in size between the Fernandez and Mitsuda phases of the reaction did not occur. The response to the heated skin antigen, made on the 6th month, was greatest on the second and third days, falling to 1 mm. in 10 days. During the first 2 days the responses to the purified antigen were smaller than those to the skin antigen or to the lepromin, but by the 7th to 18th days the responses equalled those to the lepromin.

From these results the authors conclude that the human tissue antigens, present in lepromin, contribute only to the early reaction, and that the antigens which incite the late reactions remain within the bacilli even after the permeability of the bacilli has been altered by heat or chloroform treatment, and in spite of enzyme digestion and washing. A positive Mitsuda reaction must therefore indicate a capacity to destroy the structural integrity of *Myco. leprae*.

[See also *ibid.*, 1961, v. 58, 459.] *S. R. M. Bushby*

KHANOLKAR, V. R. **Diagnosis of Leprosy.** *Leprosy Review*. 1961, July, v. 32, No. 3, 158–66, 6 figs. [Reprinted from *Triangle*.]

This article discusses the difficulty in diagnosis in its early stages and approaches the problem from the clinical and histological standpoints, with 6 helpful illustrations, one being a diagram of the histological findings, and pays special attention to the cytology. In addition to diagnosing leprosy, at all stages it is necessary to classify it and decide the stage reached in its evolution. A complete study will include clinical, bacteriological, histopathological, and immunological work. The author gives an outline of our present-day ideas on the subject of the mode of entry of the infecting bacilli and indicates the important role played by Schwann cells in the reaction to infection by leprosy, and describes the cellular and neuro-cellular reaction. He discusses also the features of the different types of leprosy and gives a useful description of the main clinical signs. This paper is worthy of detailed study in the original.

*J. R. Innes*

SOARES, A. B. de C. & MARÇAL, R. de C. Resultados das provas de diagnóstico para a doença de Hansen, em 49 doentes de "Paramiloidose de Corino Andrade". [**Results of Diagnostic Tests for Leprosy in 49 Patients with "Paramyloidosis of Corino Andrade"**] *Bol. Serviços de Saúde Pública*. Lisbon. 1960, Apr.–June, v. 7, No. 2, 125–41.

The disease of Corino Andrade [which is not defined] has a resemblance to the neural form of leprosy, as some of the following symptomatology shows.

In their 49 patients, in addition to crises of diarrhoea and constipation, the authors report superficial anaesthesia of the lower limbs and sometimes in the upper limbs, perforating plantar ulcer, amyotrophia and loss of muscular power in the extremities, numbness of the limbs, sexual impotence, thermic hypoaesthesia in the legs and feet, thermic anaesthesia, and a few dermal lesions. They found that search for leprosy bacilli in the nasal mucosa and in the skin had entirely negative results, but the skin histology was positive for the changes typical of the Corino Andrade disease while negative for any signs of leprosy. The lepromin test was not of real value in differential diagnosis because tuberculoid leprosy can show values exceeding those met with in the Corino Andrade disease. However the clinical picture and the other laboratory tests suffice to distinguish clearly between the two diseases. The results in all 49 cases are tabulated. *J. R. Innes*

MIRANDA, R. N. A propósito de um caso de manifestação aguda da lepra. Encontro de bacilos de Hansen incluídos em polimorfonucleares. Esbôço clínico e patogênico das manifestações agudas, em lepromatosos. [**A Case of Leprosy with Acute Manifestations. Presence of *Mycobacterium leprae* in Polymorphonuclears. Clinical and Pathological Observations**] *Rev. Brasileira Leprologia.* S. Paulo. 1961, Mar., v. 29, No. 1, 3–12, 9 coloured figs. on 5 pls. English summary.

QUAGLIATO, R., BERQUÓ, Elza & LESER, W. Lepromatosos em tratamento sulfônico. 1. Reativações bacterioscópicas. 2. Tempo para negativação. [**Lepromatous Leprosy under Sulphone Treatment. Bacteriological Reactivation and the Time in which it occurs**] *Rev. Brasileira Leprologia.* S. Paulo. 1961, Mar., v. 29, No. 1, 19–30, 2 graphs.

The authors studied lepromatous patients discharged from sanatoria with the disease arrested, registered in the Campinas Dispensary, negative on the occasion of their registry, and kept under observation up to 6 months afterwards on sulphone treatment. It was found that the patients registered from 1949 to 1952, expressed as cumulative coefficients of bacteriological reactivation during $3\frac{1}{2}$ to $6\frac{1}{2}$ years of observation, were significantly more frequent than those registered from 1953 to 1959. In this latter period the cumulative coefficient of reactivation ran from 0·7% in the first half year to 26·4% at $6\frac{1}{2}$ years. It was noted that reactivated patients soon became negative again.
*J. R. Innes*

BROWNE, S. G. & DAVEY, T. F. **Diamino-Diphenyl Sulphoxide in the Treatment of Leprosy: a Definitive Report on Expanded Trials.** *Leprosy Review.* 1961, July, v. 32, No. 3, 194–202, 1 fig. [15 refs.]

This report amplifies and weighs up experience with DDSO in Uzuakoli Research Unit, Eastern Nigeria, since 1957 [this *Bulletin*, 1957, v. 54, 831], and in several adjacent leprosaria, namely Oji River, Isoba, Itu, Uburu, Abakaliki, and Ossiomo. The total number of patients observed was 122, of whom 64

were lepromatous. The dosage of the drug was about 300 mgm. twice weekly by mouth, or 100 mgm. daily. DDSO was found to have a definite anti-leprosy action, giving clinical improvement in all varieties of leprosy, a consistent pattern of reduction in the bacterial index and the disappearance of morphologically normal *Myco. leprae*. This improvement is similar in all respects to that obtained with DDS therapy, and the side effects were noted to be similar, namely anaemia, psychosis, lepra reaction, erythema nodosum, and hepatitis, but the incidence of dermatitis was higher. Unfortunately in a high proportion of patients who receive standard doses of DDSO over prolonged periods, *a direct nephrotoxic action* is shown by the occurrence of albuminuria, haematuria, and the passage of casts in the urine. This action renders the further use of DDSO inadvisable, in spite of its therapeutic efficacy in all types of leprosy. *J. R. Innes*

Brechet, R. & Cochrane, R. G. **A Study of Vadrine, alone and combined with Sulphetrone.** *Leprosy Review*. 1961, July, v. 32, No. 3, 180–87, 7 figs.

Vadrine of Messrs. Geistlich Ltd. is 2-pyridyl-(4)-1,3,4-oxdiazalone-(5) p-amino salicylate and the authors refer to the trial of it by Jopling and Ridley in 1958 [this *Bulletin*, 1958, v. 55, 1237]. The present trial was conducted in Angola on 40 patients from Sept. 1955 to May 1960, and they now report on 20 of these cases wherein the lepromatous element was important. The 20 patients have been treated for an average period of 33 months. The average dose of Vadrine given was 30 mgm./kgm. of body weight. They found that it had a definite action in lepromatous leprosy during the first 2 years, the results being similar to that of DDS, or slightly better. At the end of 2 years the effect of the drug became less obvious, so that little improvement was seen after that time. The authors think that Vadrine has advantages in its rapid action in the first 12 to 18 months, in lack of toxicity and side effects, and that its reactions are at a minimum, and that the optimum dose is 30 to 40 mgm./kgm. body weight. Where there is intolerance to sulphone therapy, Vadrine is useful, but it is inadvisable to continue Vadrine therapy for more than 2 years. Combination of Vadrine with parenteral solapsone is in their experience advantageous. They point out that, as in tuberculosis, drug combinations seem to be called for, and suggest for an active lepromatous case the use of a rapidly-acting drug such as Etisul for 3 months, followed by Vadrine, combined with one of the sulphones (probably solapsone), and finally at the end of 2 years of continuous treatment with Vadrine and solapsone, the patient may be put on a diphenylthiourea (Ciba-1906). It is important to have a number of drugs available to change or combine them so as to avoid drug resistance. *J. R. Innes*

Jopling, W. H. & Ridley, D. S. **Vadrine combined with Sulphone in the Treatment of Lepromatous Leprosy.** *Leprosy Review*. 1961, July, v. 32, No. 3, 188–90.

In their previous experience with Vadrine in 7 lepromatous patients in the Jordan Hospital in England the authors noted a promising initial response and

complete absence of toxicity, but a subsequent development of drug resistance in the majority after 9–15 months of treatment [this *Bulletin*, 1958, v. 55, 1237]. They now report on a further trial in combination with sulphone in 5 lepromatous patients in the Jordan Hospital, of whom 2 were European, 1 West Indian, 1 Nigerian, and 1 Indian. Dosage of Vadrine was increased fairly rapidly to a maximum of 40 mgm./kgm. per day. The trial was too small to be conclusive, but the results suggest that the combination of Vadrine and sulphone is substantially superior to sulphone alone for the first stages of treatment of lepromatous leprosy, or until the onset of erythema nodosum leprosum.

*J. R. Innes*

ALLAN, J. A. **The Treatment of Lepromatous Leprosy with Neovadrine and Vadrine in combination with DDS.** *Leprosy Review*. 1961, July, v. 32, No. 3, 191–3.

The author conducted this trial on 21 lepromatous cases in Ngomahuru leprosy hospital, S. Rhodesia. The evaluation was by clinical impressions and bacteriological studies and a table of results is given which summarizes these features well. Neovadrine and Vadrine are related compounds. The former is 2-pyridyl-(4)-1,3,4,-oxdiazalone-(5) and the latter is the p-amino-salicylate. These drugs were found to be non-toxic when used in combination with DDS. They were found to have an adjuvant action to DDS suggesting an initial additive effect only, followed later by bacterial worsening, which suggested the emergence of resistant organisms. It seems that the ultimate duration of treatment required is not likely to be appreciably reduced compared with DDS.

*J. R. Innes*

GOLDMAN, L. **Side Effects of Ciba-1906.** *Amer. J. Trop. Med. & Hyg.* 1961, May, v. 10, No. 3, 382.

A study was conducted some years ago in the Department of Dermatology, University of Cincinnati, on 286 patients having various skin disorders (which are listed) and treated with an average dose of 1·5 gm. of Ciba-1906 (diphenylthiourea) daily for about 6 weeks. At first no reactions were noted, but recently 8 generalized morbilliform eruptions, with fever, were seen in 68 patients. These were not severe, were independent of the skin lesion, occurred during the second week of treatment and subsided rapidly when the drug was withdrawn. In one patient there was prompt recurrence when a test dose of 500 mgm. was given 2 weeks after the eruption had subsided. Other side effects observed were diarrhoea, nausea and a bad taste in the mouth. No severe blood dyscrasia or visceral toxicity was noted.

Although the drug was not used as extensively in this series as it has been in leprosy, a significant number of reactions of the minor drug-allergy type occurred and the author warns that such allergy should be considered when morbilliform eruptions occur in patients receiving Ciba-1906.

*H. J. O'D. Burke-Gaffney*

MOLESWORTH, B. D. **Preliminary Note on a Series of Cases of Lepromatous Leprosy treated with Etisul.** *Leprosy Review.* 1961, July, v. 32, No. 3, 150–52.

The author points out that the new liquid form of Etisul has much reduced the cost of treatment with this drug. He reports on a series of 22 cases treated in Ankaful Leprosarium, Ghana, wherein the favourable findings on this drug are generally confirmed, namely a rapid fall in the number of solid forms of *Mycobacterium leprae* in the smears, followed by a slower reduction in the bacillary index, which, however, was well in advance of the reduction obtained in similar cases treated with DDS alone. Clinical improvement was definite, and there was a very remarkable absence of "reactions", even in cases which had hitherto proved intractable. Those who tried the new liquid Etisul found it preferable to the cream. Of the 22 patients, 21 improved, some very markedly, and 21 showed a reduction in the bacterial index, with an average of 40%. Solid forms of *Myco. leprae* disappeared from the smears in as little as 1 month, and the average time was 3 months. A low blood sulphone did not preclude a good response, but 3 patients showing least improvement had low blood sulphone levels. The author thinks that Etisul is a very useful drug to be used in conjunction with sulphone therapy, and in the liquid form for inunction is suitable for wide use, with the hope of reducing the total time of treatment. *J. R. Innes*

JAMISON, D. G. & PALMER, Elisabeth. **The Distribution of 35S-Labelled Etisul in the Skin as indicated by Autoradiography.** *Leprosy Review.* 1961, July, v. 32, No. 3, 135–43, 8 figs.

In order to map the distribution of Etisul in human skin the authors applied a preparation of Etisul labelled with $^{35}S$ in the treatment of 4 leprosy patients in Katsina, Northern Nigeria. Skin biopsies were taken at various intervals after the inunction of the drug. These were sectioned in a plane vertical to the surface, and the position of the radioactive molecules was determined in relation to the various skin layers (and the tissue elements within them) by autoradiography. The skin for biopsy was removed from a selected standard area on the back of the forearm in every patient so that the basic histological and neurological patterns would be as comparable as possible from one case to another. The general result of the study was to show a rapid penetration of the radioactive sulphur in the skin and its selective localization in the pathological zones, which is a valuable finding and it parallels the clinical findings of the authors with unlabelled Etisul.

In one case of the present study, in a biopsy taken 3 hours after inunction, there was a large concentration of "exposed" silver particles between the hair shaft and the external root sheath close to the epidermis. In sections later in time there was a small concentration in the sub-epidermal region. This suggests that the drug enters the skin directly through the epidermis, possibly by passing down beside the hair shafts emerging through the epidermis. By 6 hours the radioactive particles had become concentrated in mast cells and in the connective tissue elements which composed the infiltrate. In some biopsies the concentration of particles was in the position occupied by the nerve bundles.

Other findings suggest that radioactive particles contained in the drug are partly excreted in the sweat, but some may enter the blood stream to appear on the opposite side of the body after 48 hours. Other findings of interest in this important paper should be studied in the original. *J. R. Innes*

VAIDYANATHAN, E. P. **Trial of a Vasodilator on Trophic Ulcers.** *Leprosy Review.* 1961, July, v. 32, No. 3, 144–9.

The author considers that in trophic ulcers any drug which would increase the blood flow to the affected part might promote quicker healing and tried nicotinic acid (Pelonin) in 15 patients with 18 ulcers. 100 mgm. were injected into the long saphenous vein: the tourniquet was kept on for 5 minutes to prevent the drug from flowing proximally. The treatment was given 3 times a week for 5 to 60 days. There were 5 patients with 9 ulcers, given as control an injection of distilled water. In 11 other patients with "skin diseases" he gave the nicotinic acid orally every day. The results were of more rapid healing in the intravenous nicotinic acid group, and primary ulcers healed more rapidly. It seems that vasodilation in the healing of plantar ulcers plays a greater part than previously thought. *J. R. Innes*

WORLD HEALTH ORGANIZATION. TECHNICAL REPORT SER. NO. 221. **Scientific Meeting on Rehabilitation in Leprosy. Vellore, Madras State, India, 21–29 November 1960. Report.** 37 pp. 1961. Geneva: Palais des Nations. [Sales agent for U.K., H.M. Stationery Office.] [3s. 6d.; $0.60; Sw.fr. 2.–.]

This report reflects the new optimism in the surgical and physiotherapeutic methods for the prevention and relief of deformities in leprosy, and because of its classification of deformities and other scientific approaches it is epoch-making and should be studied in full.

The Scientific Meeting was sponsored jointly by WHO, the Leonard Wood Memorial, and the International Society for Rehabilitation of the Disabled, with assistance from the National Institute of Neurology and Blindness of the U.S. Public Health Service, the Bureau of Medicine and Surgery of the U.S. Navy, and the Christian Medical College, Vellore (who were hosts for clinical and clerical facilities and general hospitality). Dr. J. A. DOULL was elected Chairman, Dr. J. Gay PRIETO represented WHO, Mr. D. V. WILSON the International Society for the Disabled, and Dr. R. H. BLAND came from S.E. Asia regional office of WHO. There were 20 participants, a modest number which nevertheless included orthopaedic surgeons and physiotherapists, eye surgeons, a pathologist, specialists in leprosy control, in neurology, in research in leprosy, and in anatomy. The participants included those with experience in leprosy, and also some without previous knowledge of the disease but who had expert knowledge in other scientific fields. It was found that this greatly enhanced the value of the meeting. The meeting defined its objectives as to state existing knowledge, to advise on the application of that knowledge in prevention and treatment, and to recommend further subjects for research. In discussing the extent of the problem, information was incomplete, but it seemed that a world total of 10 million cases of leprosy would be near the

mark, probably a conservative estimate. It is probable that not more than one-fifth are under care and treatment, and those with physical disability represent one-quarter of the total cases [this *Bulletin*, 1960, v. 57, 598].

There was a discussion on advances in nerve pathology. Attention was drawn to recent knowledge arising from the use of the electron microscope, whereby the site of major damage in nerve lesions is known to be the basement membrane related to the Schwann cells, the melanocytes, and the basal layer made up of epidermal cells. It may be that some antibody-antigen reaction is damaging the cell and there should be research on this. It has been possible to show that in leprosy patients with no loss of cutaneous sensibility, as many as one-quarter of the nerve fibres to the skin may be damaged.

The meeting noted that reports have been made of the benefit resulting from the use of chymotrypsin enzyme during the course of a leprosy reaction, and recommended further experience of this technique. The orthopaedic specialists drew attention to the possibility that there may be a "compression syndrome" at the site of the nerve lesions, and thought that the operation of nerve decompression might be useful in such areas as the elbow and the zygoma and the carpal tunnel.

Concerning physiotherapy and reconstructive surgery the symposium was unanimous that standard methods of treatment are applicable to leprosy, with results at least as good as those obtained by similar measures for other paralytic diseases. The paralyses of leprosy are well defined and predictable in extent; therefore the use of a small repertoire of procedures can combat disability effectively. The common deformities and the methods of physiotherapy which prove successful were listed by the meeting, also a memorandum was prepared on the training and duties of auxiliary medical workers. [It is advisable that these auxiliaries should work in cooperation with the orthopaedic and plastic surgeon or professional physiotherapist, or failing them with the doctor or nursing sister in charge of the treatment.]

The symposium also considered bone lesions in leprosy. Osteitis leprosa of the phalanges is the specific lesion in leprosy and can be healed completely and deformity prevented by immobilization of the part in a functional position during periods of pain and swelling. Standard orthopaedic measures deal well with the major bone lesions, *e.g.* osteoporosis, secondary fracture, secondary infection of bone and joint, and Charcot's joint.

Facial deformities were discussed. These have a major psychological importance in rehabilitation of the patient. The deformities include saddle nose, loss of eyebrows, and lagophthalmos. It was agreed that collapse of the nose is due to nonspecific destruction of the nasal framework by banal infection as a sequel to lepromatous ulceration of the nasal mucosa. Reconstruction is possible by standard procedures made easier by the fact that there is no skin loss. Replacement of eyebrows is an easy procedure, and also for lagophthalmos there are standard plastic operations, the simplest being tarsorrhaphy and the best the temporalis musculo-fascial sling.

Plantar ulceration was discussed and the theories of causation were reviewed. It was agreed that the major cause seems to be mechanical, and related to the strains of walking. It is most important to treat the first ulcer and better still to prevent its occurrence. There should be systematic foot inspection and treatment in the pre-ulcerative stage. Simple ulcers can be treated by medical auxiliaries but the major complications require specialized care. The simplest

method of healing a simple ulcer is to rest the patient in bed, and a walking plaster cast is almost as effective. Prevention should be by rigid-sole footwear with a rocker and a soft insole, or a shaped insole. Similar treatment will forestall recurrence of a healed ulcer.

The ophthalmologists discussed eye damage in leprosy and emphasized that blindness is avoidable in leprosy. The most dangerous conditions are severe lagophthalmos and irido-keratoscleral inflammation. Iritis is the commonest single cause of blindness in leprosy, and atropine instillation is an important weapon against it. Prevention and recognition of early signs are important.

The symposium gave a session to the means to prevent deformities by early recognition and treatment, and auxiliary medical workers can be trained to recognize early signs. Care needed by patients recovering from leprosy is similar to that of patients recovering from other chronic nerve lesions, and such treatment should be undertaken in the departments of general hospitals. Propaganda is needed to overcome fear of this, but leprosy rehabilitation should be integrated into the general medical rehabilitation service. There is need to inform reconstructive surgeons, plastic surgeons, and professional physiotherapists of the wide field open to them in leprosy, and of the great need. Most of the disabilities in leprosy—plantar ulcerations, facial deformities, blindness, etc.—are preventable, and restorative procedures are available and are efficient.

The scheme for the classification of leprosy deformities is given on p. 33 of the report. It is simple and practical. There are 4 groups (Hands, Feet, Face and Miscellaneous), with 5 types in each group except for 2 only in the Miscellaneous. On p. 34 is given a useful Annex 2 on the training of auxiliary workers in the recognition and prevention of deformities. *J. R. Innes*

ALLIS, J. B. **The Use of Paraffin in Leprosy.** *Leprosy Review.* 1961, July, v. 32, No. 3, 167–74, 4 figs.

This is a paper giving practical details of the use of paraffin in the physiotherapy of secondary symptoms of leprosy. The topical application of heat to the extremities by means of the paraffin bath gives excellent symptomatic improvement and a certain amount of physical improvement, and helps to prevent deformity. Methods and applications are described, and the formula of a suitable paraffin preparation is given. *J. R. Innes*

NISHIMURA, S. **Susceptibility of Wild Rodents to the Murine Leprosy Bacillus.** *Internat. J. Leprosy.* Wash. 1960, Oct.–Dec., v. 28, No. 4, 428–40, 18 figs. on 3 pls. [11 refs.]

In this article the author discusses the susceptibility of wild rodents to experimental infection with the murine leprosy bacillus, and the histopathological findings of the lesions in the rat, mouse and hamster were compared with those in *Apodemus speciosus, A. geisha, Meriones unguiculatus*, and *Microtus montebello.*

The results showed that the rat, mouse, hamster and *A. speciosus* are highly susceptible while the other 3 species of wild mouse show little susceptibility.

In animals of low susceptibility the intratesticular route gives better results than does the subcutaneous route. In highly susceptible animals, small doses (0·2 x $10^{-3}$ of leproma) are preferable to large doses as they avoid reactions from the injected tissue; in susceptible animals successful passage of the organism can be made within a year but this period is insufficient for the more resistant animals.

Compared with the lesions in the rat, those in the mouse, hamster and *A. speciosus* show less connective tissue, an absence of Langhans's giant cells, and marked bacillary proliferation, and the rat leprosy cells in these lesions are always swollen and of monocyte-like shape; there is no involvement of the nervous tissues. In the less susceptible wild mice, the subcutaneous lesion appears to be a transient granuloma.

In discussing these results the author expresses the view that susceptibility to leprosy depends on the presence of a growth factor in the host's cells rather than on strength of resistance. *S. R. M. Bushby*

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## HELMINTHIASIS

*In this section abstracts are arranged as far as possible in the following order:—*Trematodes (*schistosomes, other flukes);* Cestodes (*Diphyllobothrium, Taenia, Echinococcus, other cestodes*); Nematodes (*hookworms, Ascaris, filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

Beheyt, P., Lebrun, A., Cerf, J., Dierickx, J. & Degroote, V. Étude de la toxicité pour l'homme d'un insecticide organophosphoré. [**Toxicity for Man of an Organophosphorus Insecticide**] *Bull. World Health Organization.* Geneva. 1961, v. 24, Nos. 4/5, 465–73, 4 figs.

Organophosphorus compounds have come into use as insecticides since insect resistance to the chlorinated hydrocarbons has become apparent. It therefore becomes necessary to determine the toxicity to man of these compounds. Among the organophosphorus insecticides the toxicity of Dipterex (Bayer L 13/59) has proved to be remarkably low, its LD50 for the rat being 630 mgm./kgm. This compound (0-0-dimethyl (hydroxy-1 trichloro 2,2,2 ethyl) phosphonate) is a cholinesterase inhibitor in insects; as it may act similarly on the intestinal helminths of man its toxicity for man has been particularly investigated by the authors.

37 Africans with various forms of intestinal helminthiasis were given Bayer 2349, a purified form of Dipterex. Detailed studies of the blood, liver function, serum proteins by electrophoresis, urine and electrocardiograms were undertaken. In addition there were sundry biochemical tests and repeated determinations of the whole blood, plasma and red cell cholinesterase levels; the latter fell rapidly and were markedly lowered for several days.

The drug was given orally once daily in tablets; 7 patients had 0·5 gm. daily for 2 days; 21 had 1 gm. daily for 2 days; and 9 had 1·32 gm. daily for 2 days after a preliminary injection of 0·5 mgm. of atropine sulphate. Several patients suffered abdominal colic beginning about 3 hours after the dose and lasting

for a few hours; in 5 cases this was sufficiently severe to justify treatment with an antispasmodic drug. The incidence and severity of side effects were proportional to the dosage; nausea, vomiting and giddiness were added to the colic in the groups of patients on the higher dosages. It is suggested that 7·5 mgm./kgm. would be a dose adequately tolerated by ambulant patients.

The anthelmintic efficacy of the compound is to be the subject of another report. *A. R. D. Adams*

LeRoux, P. L. **Some Problems in Bilharziasis in Africa and the Adjoining Countries.** *J. Helminthology.* 1961, Suppl., 117–26.

This paper reviews briefly some of the outstanding biological problems of African schistosomiasis. It is divided into 5 sections of which the first two are concerned with the taxonomy and geographical distribution of the schistosome parasites and their molluscan hosts. The author deals with some of the dubious records of schistosome species and concludes that the certain identification of any of the species is extremely difficult from characters of the eggs alone. In the third section some suggestions are made about the importance of schistosome infections in man and animals and the fourth part deals with the question of immunity and it is suggested that schistosomes of animals and man may be mutually exclusive to some extent. The final section is concerned with the seasonal transmission of the disease and the bearing which this has on control.

*C. A. Wright*

i. Marill, F. G. Première enquête sur l'épidémiologie des bilharzioses en Mauritanie. [**Preliminary Epidemiological Survey for Schistosomiasis in Mauritania**] *Bull. Acad. Nat. Méd.* 1961, v. 145, Nos. 20/21, 436–8.

ii. ————————. La recherche systématique de l'albuminurie comme test d'orientation d'une enquête sur la diffusion de la bilharziose urinaire. [**Routine Testing for Albuminuria as a Screening Measure in Surveys for Urinary Schistosomiasis**] *Ibid.*, 438–40.

iii. ————————. Diffusion de la bilharziose chez les bovins, ovins et caprins en Mauritanie et dans la vallée du Sénégal. [**Incidence of Schistosomiasis in Slaughter Animals in Mauritania and the Senegal Valley**] *Ibid.*, Nos. 5/6, 147–50.

i. This study, made in May–October 1960, was limited to *Schistosoma haematobium* infections in man and schistosomiasis of slaughter animals since the author had reason to doubt the presence of *S. mansoni* in the area. The survey was made in various places, which are named, in the south-west quadrant of Mauritania where population is high. 26·5% of 1,580 samples of urine from children and young adults (6 to 18 years) were positive. The study was made at the end of the dry season when the rains had begun and the author has reason to suspect that this figure does not reflect the full infection rate.

In the Senegal valley, incidence increased as the east was approached and varied from 10·5% to 27·5%. In the northern regions the incidence was higher:

the average in 3 areas in the valley was 19·6% and in 3 areas in the north, where surface water is used, was 54·4%.

*Bulinus* sp. was found in only 3 collections in the alluvial plains of the Senegal valley, but again the seasonal factor made these findings of limited value.

In the northern area *Bulinus* sp. was found in 8 sites in the Adrar area, north-west of Atar, and in 2 of 4 sites in the Tagant region.

In the 3 foci in the Senegal valley, no cercariae were obtained from the snails, but in the Adrar and the Tagant areas, *Bulinus* in all 10 collections were infected: the rate of emission of cercariae varied between 6% and 32%.

Further studies are to be pursued on the part played by the Senegal river in the distribution of the snails on the alluvial plains, their multiplication, and vector potentials and the possibility of *S. bovis* [see below] infecting man in Mauritania and Senegal. Small forms of *Biomphalaria* were found also in the Senegal valley and in the Adrar region and their potential as vectors of *S. mansoni* is to be investigated.

ii. The presence of blood and schistosome ova in urine suggests that albuminuria should be found in urinary schistosomiasis and the author, during the survey recorded above, studied the possibilities of testing urines for albumin as a screening test in such epidemiological studies.

He tested 1,359 samples of urine for albumin. In 964 which were negative for blood or schistosome ova, 96·7% were negative for albumin. In 395 in which blood or ova or both were found 90·4% were positive. Details of various groups of subjects are given. In the case of the 357 positive subjects, the urine was clear in 148. Of the 38 negative urines, 26 showed the presence of blood.

The author does not claim to interpret these findings or to suggest that a non-specific albuminuria should be used to establish the diagnosis of schistosomiasis; but he does suggest that if his results are confirmed, this quick and simple method might be useful as a preliminary screening measure in the planning of epidemiological surveys for urinary schistosomiasis.

iii. During the same season and in the same broad area as that described above the author studied autopsy material from slaughter animals in abattoirs in 12 different places in the region. Diagnosis of schistosomiasis was made by examination of the mesenteric veins and was confirmed later by the finding of worms, ova or granulomata in the viscera.

The results are tabulated. Of 249 animals examined 43·3% were positive (63·2% of cattle and 30·4% of sheep and goats). The author assumed all of these infections to be due to *S. bovis*, but the possible presence of other species is to be the subject of a more prolonged study.

A striking correlation was found between the incidence of schistosomiasis in domestic animals and urinary schistosomiasis in man; examples are given and the author attributes this relationship to the presumed presence of a common snail host, *Bulinus* sp.

The epidemiological and economic implications are discussed.

*H. J. O'D. Burke-Gaffney*

KUNTZ, R. E. **Passage of Eggs by Hosts infected with** *Schistosoma haematobium*. *J. Helminthology*. 1961, Suppl., 107–16. [10 refs.]

"Study of a series of lower vertebrates and 2 primates infected with *Schistosoma haematobium* has revealed their egg producing or egg passing

potentials. Viable eggs were not passed by albino or wild rats (*R. rattus*), or by hedgehogs (*Hemiechinus*). In hosts passing eggs the counts were not great but data do suggest host-parasite relationships which permit continuance of the parasite cycle. Egg passage was erratic and tended to follow a normal curve, i.e., few eggs at first, building up to a peak period after which the counts usually diminished. There was no close correlation between the sites of egg deposition along the intestinal tract and the number of eggs produced. The peak of egg production was irregular in time after first egg detection as well as in duration. There was wide range in the percentages of viable eggs passed by different hosts and by individuals of the same species. Data reveal the possibility of lower vertebrates serving as reservoirs should satisfactory circumstances allow."

WAGNER, A. **Papillae on Three Species of Schistosome Cercariae.** *J. Parasitology*. 1961, Aug., v. 47, No. 4, Sect. 1, 614–18, 6 figs. [22 refs.]

BRYGOO, E. R. Substance alcoolo-acido-résistante de la coque de l'oeuf de quelques schistosomes. **[Alcohol-Acid-Fast Substance in the Egg-Shell of Certain Schistosomes]** *Arch. Inst. Pasteur de Madagascar*. 1961, v. 29, 81–2.

The author and his colleagues have already recorded the presence of an acid-alcohol-fast (AAR) substance in the egg-shell of *Schistosoma mansoni* [this *Bulletin*, 1959, v. 56, 1153] and its absence from that of *S. haematobium*. They have also demonstrated this substance in the vitelline glands of *S. mansoni* [*ibid*., 1960, v. 57, 717; 1961, v. 58, 335]. They were anxious to see whether this difference in Ziehl-Neelsen staining extended to other schistosomes, particularly those of *S. intercalatum*, but they were unable to obtain the required material. However, paraffin blocks of tissues from animals infected experimentally with *S. japonicum* and *S. bovis* were obtained from Professor GALLIARD in Paris and with *S. mattheei* from Dr. PITCHFORD in South Africa. Ziehl-Neelsen staining showed that eggs of *S. japonicum* contained the AAR substance in their shells, thus resembling those of *S. mansoni*, while those of *S. bovis* and *S. mattheei* were negative, like *S. haematobium*.

On the other hand, both *S. bovis* and *S. japonicum* contained the AAR substance in the vitelline glands like *S. mansoni*. This is of interest, since *S. bovis* did not show the substance in the eggs. It is suggested that in this species the granules are non-functional and the question is posed whether the egg-shell may pass through an AAR stage *in utero*, this property subsequently disappearing because of a different chemical development. Only serial sections of adult worms will answer this question. *H. J. O'D. Burke-Gaffney*

ROBINSON, D. L. H. **Phosphatases in *Schistosoma mansoni*.** *Nature*. 1961, July 29, v. 191, 473–4, 2 figs.

PRINGLE, G. & MSANGI, A. S. **The Experimental Study of Water Snails in a Fish Pond in Tanganyika. I. Preliminary Trial of the Method.** *East African Med. J.* 1961, June, v. 38, No. 6, 275–93, 6 figs.

In devising an experimental approach to the problems of the ecology of the snail intermediate hosts of schistosomiasis the authors have encountered the difficulty of finding a standard sampling method. This paper describes the testing of several methods in a specially prepared fish-pond where it is relatively easy to control the technique and to check the validity of the results.

The method adopted consists of making exhaustive collections from defined representative areas of the habitat and multiplying these results by a factor based on the relative areas of the sampled part and the total area of that type of habitat.

The results of this method have been compared with those obtained by trapping on bamboo rafts and by the release and recapture of marked snails, and have been found to be more accurate than either of these two approaches. A number of trends in population density of several species of snails are recorded but it is noted that subsequent attempts to repeat some of these trends have failed: the investigations are continuing. The results are set out in tables and figures and discussed fully. *C. A. Wright*

WATSON, J. M. & AL-ALI, A. S. **The Breeding of *Bulinus truncatus* in Total Darkness.** *J. Helminthology.* 1961, Suppl., 199–204.

The ability of *Bulinus truncatus* to breed in the dark has considerable bearing on the efficacy of covered irrigation channels as a control measure for schistosomiasis. Watson and Al-Ali have successfully raised the snails from wild-caught egg-masses in a totally enclosed incubator to which light was only admitted for two minutes a day at the most. The mortality among the young snails was very high, out of an initial total of 200 only 4 reached sexual maturity and these laid eggs 70 days from the start of the experiment. Despite these findings the authors believe that darkness has a restrictive effect on population growth and recommend that, wherever possible, covered irrigation channels and piped water should be used.

[See also this *Bulletin*, 1957, v. 54, 709; 1958, v. 55, 177.] *C. A. Wright*

DE CARVALHO, A. M. & JANZ, G. J. Subsídios para o conhecimento e identificação dos hospedeiros intermediários de esquistossomas humanos em Angola. I. *Bulinus.* [**Observations on the Intermediate Hosts of Human Schistosomiasis in Angola. I.** *Bulinus*] *Anais. Inst. Med. Trop.* Lisbon. 1960, Jan.–June, v. 17, Nos. 1/2, 99–111, 5 figs. & 5 pls. [10 refs.] English summary (9 lines).

This paper describes the shells and anatomy of four species of the molluscan genus *Bulinus* from Angola. *B. globosus* is reported to be the only species found to be naturally infected with the larval stages of *Schistosoma haematobium.* The other species described are *B. tropicus angolensis, B. forskali* and *B. scalaris.* The description given of *scalaris* is interesting because the details

of the male copulatory organ agree well with the structure usually found in this species but the shell which is illustrated is most unusual in that it is strongly ribbed and shouldered. *C. A. Wright*

BARBOSA, F. S., CARNEIRO, E. & BARBOSA, I. **Notes on the Morphology and Taxonomy of the Planorbid Snail *Biomphalaria pfeifferi* (Krauss) from South-East Africa.** *Ann. Trop. Med. & Parasit.* 1961, July, v. 55, No. 2, 242–8, 6 figs. [10 refs.]

"1. Specimens of *Biomphalaria pfeifferi* from three regions in southern Africa were dissected and their morphology was studied. It was found that the snail was morphologically distinct from the Brazilian species *Tropicorbis centimetralis*, with which it was recently confounded. Complete reproductive isolation existed between *B. pfeifferi* and three Brazilian species with which it was mated (*Australorbis glabratus*, *A. nigricans* and *T. centimetralis*).

"2. The possibility that another snail morphologically similar to *T. centimetralis* is present in the African continent cannot be excluded. Further research is necessary to clarify this point."

[See this *Bulletin*, 1958, v. 55, 1134.]

RIEBER, S., ANDERSON, R. I. & RADKE, M. G. **Serologic Diagnosis of *Schistosoma mansoni* Infections. III. Isolation and Purification of Antigen from Adult *S. mansoni* for the Complement Fixation Test.** *Amer. J. Trop. Med. & Hyg.* 1961, May, v. 10, No. 3, 351–5, 1 fig. [19 refs.]

Large quantities of *Schistosoma* worms (750 mgm. in a batch) were fractionated by extraction with various solvents, and the different fractions were examined for antigen by a complement-fixation test with serum from a patient and from an immune, infected monkey [this *Bulletin*, 1961, v. 58, 84].

There were 5 ether-soluble lipid fractions, totalling 25% of the weight; these contained no antigen reacting with *Schistosoma* antiserum, although two did react with syphilitic sera. The saline-soluble (protein) constituents were separated into 7 fractions, and the antigen seemed to be concentrated in the acid-insoluble protein fraction (precipitated at *p*H 4·8) which was only a small proportion of the original material. According to electrophoresis, only one protein component was present in this material and carbohydrate was absent. Soluble carbohydrates represented 5·2% of the original, dried schistosome, but they contained no antigen capable of fixing complement.

[This is an important technical paper about the purification of schistosome antigens, and the original should be consulted for details.] *F. Hawking*

LACHMAN, S. J. **The Early Diagnosis of Bilharzia. The Katayama Syndrome.** *Med. Proc.* Johannesburg. 1961, July 15, v. 7, No. 14, 280–84. [12 refs.]

Schistosomiasis is prevalent in the vicinity of Johannesburg. Early diagnosis enables specific treatment to be given before the female worms lay the eggs which cause the lesions of the developed disease.

The author records the case histories of 3 youths (aged 11 to 17 years) seen by him in the reactive stage of schistosomal infection between 3 weeks and 3 months after exposure to cercarial infection. These are fairly typical. In all there was ill-health with progressive loss of weight; there was an eosinophilia, in one case very marked; complement-fixation tests in the 2 patients seen 3 weeks after infection were doubtful; but in the patient who was least unwell and was seen 3 months after infection the test was strongly positive. All the patients were treated with lucanthone with marked immediate benefit.

In any indeterminate febrile illness in children in this area a possible diagnosis of schistosomiasis should be considered.

[See also FERREIRA *et al.*, p. 1265, below.] *A. R. D. Adams*

BURNETT, H. S. & WAGNER, E. D. **Tris (*p*-Aminophenyl) Carbonium Salts in the Treatment of Schistosomiasis in Nyasaland.** *Amer. J. Trop. Med. & Hyg.* 1961, July, v. 10, No. 4, 548–50.

Tris (*p*-aminophenyl)-carbonium chloride and tris (*p*-aminophenyl)-carbonium 4, 4′-methylene bis (3 hydroxy-2-naphthoate) pamoate known as the chloride and the pamoate of CI-403, have been tested in purified form for their schistosomicidal properties and toxicity. They showed promise of prophylactic and of therapeutic action in mice and monkeys infected with *Schistosoma mansoni*.

There is a high incidence of schistosomiasis among the patients at the Malamulo Hospital and Leprosarium in Nyasaland; 30 of them (23 with *S. haematobium*, 4 with *S. mansoni* and 3 with double infections) were treated, chiefly as out-patients, with one or other salt of CI-403 and remained under observation for 4 to 12 weeks thereafter. 34 other patients were similarly treated, but they could not be followed up adequately. The drugs were given orally in tablet form, the dose being calculated in terms of the carbonium ion. The daily dosage (divided into 3) was 15–65 mgm./kgm. for 5–14 days, each tablet containing the equivalent of 100 mgm. of carbonium ion. 13 patients with *S. haematobium* were given CI-403 chloride to a gross dosage of 223–579 mgm./kgm.; 9 of these subsequently ceased to pass eggs in the urine throughout the period of post-treatment observation. One of 2 patients with *S. mansoni* similarly treated with the chloride ceased to pass eggs in the stools. 13 patients with *S. haematobium* were given 159–788 mgm./kgm. of the pamoate and 7 ceased to pass eggs over the period of observation. Of 5 patients with *S. mansoni* likewise treated with the pamoate 3 ceased to pass eggs. Included in the 30 patients were 3 with infections with both *S. haematobium* and *S. mansoni*. Of these 3 a patient treated with a total of 330 mgm./kgm. of the chloride ceased to pass eggs of the former parasite but continued to pass *S. mansoni* eggs throughout the period of observation. Another was given a total of 788 mgm./kgm. of the pamoate with very marked reduction in excretion of *S. haematobium* and a lessening of passage of *S. mansoni* eggs. The third doubly-infected patient had been passing relatively few eggs of either parasite and only a single *S. haematobium* egg was recovered during post-treatment observation.

There were toxic side effects of the drugs in about one-third of those treated and they took the form of nausea and vomiting. These were common under treatment with the chloride and unusual with the pamoate.

Thus, judged by stoppage of passage of eggs, both CI-403 chloride and CI-403 pamoate act on the schistosomes. The period of observation was too short to warrant claims of parasitic cure, but the lack of toxicity of CI-403 pamoate suggests the desirability of its further study for this purpose.

*A. R. D. Adams*

GILLET, J., BRUAUX, P., NANNAN, P. & LUKALI, G. Essais sur le terrain avec le nouveau molluscocide " Bayer 73 ". [**Field Trials with a New Molluscicide, Bayer 73**] *Ann. Soc. Belge de Méd. Trop.* 1961, Feb. 28, v. 41, No. 1, 35–43.

The authors have previously tested this new molluscicide, 5-chlorosalicylic acid (2 chloro-4 nitro) anilide, in the laboratory, with satisfactory results.

Field trials were carried out in irrigation systems at Sange and Lubarika in the former Belgian Congo. The new molluscicide in a concentration of 0·5 to 1 part per million was found to be more effective and more economical than sodium pentachlorophenate in a concentration of 5 to 20 parts per million. In the irrigation canals in the Sange area, which had been invaded by dense vegetation, a concentration of 0·5 parts per million was maintained for 8 hours; 60 days later the density of molluscs had only reached a quarter of the original figure of 95·2 per man-hour of collection. The authors give figures for other similar trials. The new molluscicide was more effective than sodium pentachlorophenate against mollusc eggs; it also killed *Schistosoma* cercariae.

A disadvantage is its extremely lethal action on fish ; in the area of the trial the fish were small in size and of no economic importance. *M. J. Colbourne*

DE MORAES, R. F. & DE REZENDE, J. M. Relato de 2 casos autóctones de esquistossomose mansoni no estado de Goiás. [**Two Autochthonous Cases of *Schistosoma mansoni* Infection in the State of Goiás, Brazil**] *Rev. Goiana Med.* 1960, July–Sept., v. 6, No. 3, 273–8. English summary (2 lines).

RICHARDS, C. S. **Emergence of Cercariae of *Schistosoma mansoni* from *Australorbis glabratus*.** [Research Notes.] *J. Parasitology.* 1961, June, v. 47, No. 3, 428.

The author, from the Communicable Diseases Centre, U.S. Public Health Service, writes from San Juan, Puerto Rico. He reports field and laboratory studies aimed at clarifying the subject of cercarial emergence.

Albino *Australorbis glabratus* and local strains with little pigment were exposed to miracidia of *Schistosoma mansoni* when they were only a few days old. Under laboratory conditions these provided specimens shedding cercariae at about 10 mm. diameter, with transparent shells and almost transparent bodies.

Cercariae seen emerging from sporocysts in the digestive gland migrated by wriggling movements around the central sides of the whorls in the blood sinuses, which were tinted with haemoglobin. Cercariae could be seen within the pericardium and the aorta, moving in spurts. None was seen leaving the blood

system before reaching the apertural region; after emergence, occasional cercariae entered the pulmonary cavity before leaving the snail.

The cercariae emerged from the blood vessels of the pseudobranch or the mantle edge, usually appearing first in those of the pseudobranch; from here they either pierced the tissues and wriggled free or passed along the vessel to the portion of the mantle covering the callus, where emergence occurred. Several cercariae could sometimes be seen lined up in a series of blood vessels. At times, cercariae moved backwards and forwards in the vessel between the mantle and the pseudobranch. When several cercariae were present, they often emerged in rapid succession through the same point in the tissues and at times cercariae were seen emerging from the vessels of the mantle collar.

Emergence from *A. glabratus* of a similar type was seen with 3 kinds of cercariae other than *S. mansoni*, and 5 kinds of cercariae were seen to emerge from 4 other species of snails in the same way. The findings corroborate those of Duke [this *Bulletin*, 1952, v. 49, 1134]. At the laboratory temperatures of these experiments (78°F. to 86°F.) the earliest emergence was seen on the 17th day of exposure. *H. J. O'D. Burke-Gaffney*

Ferreira, L. F., Naveira, J. B. & Da Silva, J. R. Fase toxémica da esquistossomose mansoni. Considerações a propósito de alguns casos coletivamente contaminados em uma piscina. [**Toxaemic Phase of** *Schistosoma mansoni* **Infection. A Few Cases of Collective Contamination in a Swimming Pool**] *Rev. Inst. Med. Trop. São Paulo.* 1960, Mar.–Apr., v. 2, No. 2, 112–20. [13 refs.] English summary.

The authors first point out that the active toxaemic phase of infection by *Schistosoma mansoni* has not received the attention that it merits and that it often passes undetected.

They then describe an incident where a party of 12 persons—4 adults, 2 teenagers, and 6 children aged 5 to 12—staying on an estate in the State of Minas Gerais, Brazil, frequently bathed in the owner's private swimming bath over a period of 5 days.

About 30 days later they felt unwell and 46 days after the first bathe were attacked with high fever and had painful enlarged livers. Typhoid was suspected and they were treated with chloramphenicol which caused the temperatures to fall but on the 5th day of treatment a blood examination showed a leucocytosis and a marked eosinophilia. One of the patients was then informed by the owner of the estate that he himself as well as others who had bathed there had had fever and that examination of the water had shown large numbers of cercariae of *S. mansoni*.

7 of the patients on admission to hospital had *S. mansoni* ova in the faeces, 2 others had a positive intradermal test with an antigen made from adult *S. mansoni*, in 2 others the reaction was doubtful and no ova were found in the faeces, and 1 patient had no intradermal test but no ova were found in his case.

The patients all mentioned that they had felt itching during their bathing, but none had severe diarrhoea, and only 1 had a cough. When seen 2 months after infection the patients were debilitated, complained of vague ill-health, occasional headache and diffuse generalized pains. 5 months after infection liver function

tests were carried out on 4 patients together with serum electrophoresis. The phoretograms are not shown but the authors state that liver function tests and phoretograms may be of value in identifying the acute form of schistosomal infection.

They conclude that acute schistosomal infections occur in Brazil more often than has been thought so far; the clinical picture does not correspond with the so-called "classical" description; in patients with fever and a suggestive history one should think of an *S. mansoni* infection; the eosinophil count and the intradermal test are of great value in diagnosis.

[See also this *Bulletin*, 1958, v. 55, 1347; 1959, v. 56, 308.]

*W. K. Dunscombe*

CHAVES, E. Cor pulmonale crônico esquistossomótico. I. Estudo das lesões vasculares associadas à hipertensão pulmonar. [**Chronic Schistosomal Cor Pulmonale. I. Study of Vascular Lesions associated with Pulmonary Hypertension**] *Rev. Inst. Med. Trop. São Paulo.* 1960, Mar.–Apr., v. 2, No. 2, 78–89, 10 figs. [39 refs.] English summary.

Out of 187 necropsies performed between 1951 and 1959 at Bahia, Brazil, on persons infected with schistosomiasis 50 showed ova of *S. mansoni* in the lungs; 8 of these had chronic schistosomal cor pulmonale and 6 of them form the subject of this paper.

Macroscopically all had portal hypertension, splenomegaly, and oesophageal varices, with enlargement of the heart, right ventricular hypertrophy and, in 4 cases, dilation of the right auricle. The pulmonary arteries showed atheroma. Microscopically the lungs showed the following:—the arterioles and small arteries showed active endarteritis with infiltration of the subendothelium with a substance of an apparently protein nature, and usually concentric fibrocellular thickening of the intima causing a moderate reduction in the lumen. Occasional small vascular dilatations were seen which sometimes united to form a characteristic neo-vascular network; arteriovenous fistulae were also seen. The bronchial arteries showed little or no change. The author considers that these changes are independent of the presence of ova or adult worms. The initial lesion seems to be a diffuse endarteritis. In the 6 necropsies studied there was a direct relationship between the vascular lesions and the lung symptoms. The lesions are progressive and irreversible and specific treatment is of no value. These vascular lesions have never been seen in the absence of the aetiological agent. The appearances are shown in 10 photomicrographs.

*W. K. Dunscombe*

FERGUSON, F. F., RICHARDS, C. S. & PALMER, J. R. **Control of *Australorbis glabratus* by Acrolein in Puerto Rico.** *Pub. Health Rep.* Wash. 1961, June, v. 76, No. 6, 461–8. [13 refs.]

A series of trials with the herbicide acrolein in Puerto Rico have shown that it has good molluscicidal qualities, particularly in evenly flowing streams and irrigation channels. Owing to the volatile nature of the compound there are

difficulties in its application under certain circumstances. The results of the trials are variable; in one case, in an irrigation canal, an initial application of 26 p.p.m. was reduced to 17 p.p.m. 6 miles from the origin, 6 p.p.m. at 19 miles and 3 p.p.m. at 20 miles; both snails and aquatic weeds were killed at 20 miles. In another case an initial dose of 160 p.p.m. was reduced to 35 p.p.m. at 0·7 miles downstream and only partial kills of *Australorbis* snails were obtained at 0·75 miles and *Elodea* weed was only damaged at 1·2 miles. In several trials kills of fish and freshwater shrimps were recorded.

*C. A. Wright*

RADKE, M. G., RITCHIE, L. S. & FERGUSON, F. F. **Demonstrated Control of *Australorbis glabratus* by *Marisa cornuarietis* under Field Conditions in Puerto Rico.** *Amer. J. Trop. Med. & Hyg.* 1961, May, v. 10, No. 3, 370–73, 6 figs.

The potential value of the snail *Marisa cornuarietis* as a biological control agent against *Australorbis glabratus* has already been studied [this *Bulletin*, 1959, v. 56, 460, 850.]

The present authors, from Puerto Rico, have now made a quantitative study on this point and on the interrelationships between the two snails in ponds with heavy aquatic vegetation. The site chosen was a small natural watershed that had harboured *Australorbis* for many years. It had a chain of 5 ponds, each with a dense foliage, mostly of ornamental lilies. The largest pond was a reservoir for the others below it. The ponds were flooded by heavy rains, but with little effect on *Australorbis* snails which were protected by the vegetation. In two of the ponds the *Australorbis* were infected with *Schistosoma mansoni* up to 25%.

The ponds are illustrated in a sketch plan. 10 collection sites, each 50 feet long, were selected along the margins of the ponds. The density of *Australorbis* was determined in September 1957 and collections were repeated 3 weeks later when 200 *Marisa*, reared in other ponds, were released into each of the test ponds, but not in the collecting channels.

Snails were collected at each station every 6 weeks for 81 weeks. All snails were counted, measured and returned to their sites (except infected *Australorbis*). *Marisa* were classified into small, medium and large groups.

*Marisa* propagated throughout the test period, and after the first two collections the numbers increased steadily until the 63rd week. Propagative activity was indicated by the fact that nearly two-thirds of the *Marisa* collected were " small ".

Numbers of *Australorbis* reached peaks at the 9th and 45th weeks but otherwise decreased steadily as *Marisa* rapidly increased. This is illustrated strikingly in 2 figures. The numbers of *Australorbis* shedding *S. mansoni* cercariae also decreased and after the 57th week none was positive. No living *Australorbis* were found after the 75th week.

The heavy growth of lilies was eradicated in 51 to 75 weeks and 2 photographs show this remarkable change. Many *Marisa* were washed into the connecting channels, but these offered little food for the snails. The average time required for *Marisa* to destroy the *Australorbis* and the vegetation was 1½ years, which is considered " dramatic ".

For the first 39 weeks, the slow but steady increase of *Marisa* resembled the lag phase, after which it was apparently logarithmic. This is clearly shown in a figure which indicates that at the 39th week the numbers of *Marisa* were about 200, at the 57th they were 2,000 and at the 63rd they were more than 3,000. As no further increase in *Australorbis* appeared after the peak about this time, it would seem that *Marisa* devoured *Australorbis* eggs and young snails while feeding on the foliage. After 63 weeks, no small snails were found at any site. The effect of *Marisa* on adult *Australorbis* was not apparent, but at 51 weeks they were found feeding on shells of living *Australorbis*.

A later extensive survey up to September 1960 showed that a few *Australorbis* remained in the channels, in a few small marshes and in a headwater lake. The persistence may be due to seeding from lateral and headwater sources.

*H. J. O'D. Burke-Gaffney*

TRIPP, M. R. **Is *Bacillus pinottii* Pathogenic in *Australorbis glabratus*?** [Research Notes.] *J. Parasitology*. 1961, June, v. 47, No. 3, 464.

Uncontrolled field studies by DIAS and others have been made on the use of *Bacillus pinottii* in the biological control of snails [this *Bulletin*, 1955, v. 52, 660, 797; 1956, v. 53, 213, 609] and the author, from the Harvard School of Public Health, gives details of laboratory studies made in an attempt to confirm the pathogenicity of this bacillus for *Australorbis glabratus*. The strain of *B. pinottii* had been procured from Dias in Egypt in 1954 and had been maintained by subculture about once or twice a year. In 1959 it was found to be similar to that described by CRUZ and DIAS [*ibid.*, 1954, v. 51, 284] except that it was negative for litmus milk and indol. *A. glabratus* strain PR-1 maintained in the laboratory since 1954 [*ibid.*, 1956, v. 53, 1445] was used throughout. The experimental protocol of Dias [*ibid*, 1956, v. 53, 776] was followed, with the snails in flasks containing various dilutions of peptone to which cultures of *B. pinottii* or sterile peptone were added. Full details are given.

All snails died within a few days to a month, according to the dilution of peptone, whether *B. pinottii* was present or not. This contrasts with the findings of Dias who found that snails died sooner in the presence of *B. pinottii*. In tissue sections of the snails no bacteria or pathological changes attributable to them could be found. The only change was atrophy, probably due to starvation and this was similar in unfed control snails held in water.

In experiments in aerated jars in which the snails were fed on a lettuce, all snails were killed or a few survivors grew poorly at high peptone concentrations, but all survived at concentrations of 1 in 10,000 to 1 in 100,000, grew well and reproduced. The findings in tissue sections were again negative.

Finally snails were injected in the cephalopedal sinus with peptone cultures of *B. pinottii* in distilled water: viable *B. pinottii* were recovered at 2 and 48 hours, but not later, survival and growth over 10 weeks were similar to those in control snails injected with distilled water only, and bacilli could be found in tissue sections fixed at 10 minutes and 1 hour after injection but not later.

It was apparent that this strain of *B. pinottii* was not pathogenic for *A. glabratus* under the experimental conditions studied. No other strain was available at the time of writing. *H. J. O'D. Burke-Gaffney*

MAGALHÃES, A., Jr. & COUTINHO-ABATH, E. **Splenic Reactions in Swiss Albino Mice to Single and Multiple Infections with** *Schistosoma mansoni*. *Amer. J. Trop. Med. & Hyg.* 1961, May, v. 10, No. 3, 356–64, 9 figs. on 3 pls. [42 refs.]

Mice were infected with cercariae of *Schistosoma mansoni*. 70 were infected once only and were killed at intervals between 3 and 79 days after infection to observe the weight of the spleen during an uncomplicated infection; 20 mice were reinfected weekly, beginning 60 days after the first infection, and 3 animals were killed 24 hours after each reinfection; 10 animals were reinfected on 5 consecutive days, beginning 60 days after the first infection, and they were killed 24 hours after the last infection.

In the mice infected only once, the spleen enlarged from 203 mgm. to become 220 mgm. between the 30th and 39th days, and up to an average of 292 mgm. between the 40th and 49th days, after which it returned to normal size. In the mice reinfected at weekly intervals the average spleen weight was 233 mgm. (not significantly greater than the others). In the mice reinfected daily for 5 days, the average spleen weight was 387 mgm.

Histologically, in the mice infected only once there was lymphatic and reticular hyperplasia which began on the 3rd day after infection and which became more pronounced after the 40th day. In the animals reinfected several times the hyperplasia was much more intense. This hyperplasia represents a reaction of the reticulo-endothelial system to foreign protein liberated by the worms and their eggs. The splenic reaction does not depend upon presence of eggs themselves in the spleen. *F. Hawking*

YAKEISHI, Y. **Clinical and Pathological Studies on Schistosomiasis japonica.** *Tokushima J. Exper. Med.* 1961, Feb., v. 7, No. 4, 289–300, 9 figs. [33 refs.]

Some 400 patients with *Schistosoma japonicum* infections have been studied, 20 of them being admitted for surgical treatment at Kyushu University Hospital, Japan. Of the latter, 16 patients had oesophageal varices; the spleen was enlarged in all but one of them; none had ascites. Blood studies on these 20 patients showed a numerical reduction in all blood cells and thrombocytes; the marrow in each was hyperplastic, with an increase in nucleated cells and reticulocytes. Splenectomy, it was found, resulted in substantial reversion of the cellular blood and marrow pictures to normal, probably as a result of arrest of the inhibitory splenic action on the marrow.

Liver function tests showed little variation from normal; periportal fibrotic, pseudolobular or intermediate connective tissue proliferation was noted histologically, and there was granuloma formation around eggs.

Fibrosis of the red pulp was the histological feature of significance in the spleen; it was especially conspicuous in the subcapsular regions. A deposit of hyaline material in the spleen follicles was another significant feature.

The mortality from bleeding from ruptured oesophageal varices was 11 of 169 patients (6·5%). Eck's operation (portocaval shunt) was attended by a mortality of 10–15%. Though this operation may be necessary to relieve severe portal hypertension the author has found that resection of the gastric coronary vein together with splenectomy proved effective in many of his cases. This

procedure causes interruption of the blood flow to the oesophageal varices, and it terminates the spleen's inhibitory action on the bone marrow.

*A. R. D. Adams*

BAILENGER, J.; CAILLAU, M.; PAUTRIZEL, R. La distomatose. I. État actuel de son épidémiologie dans le Sud-Ouest de la France [BAILENGER, CAILLAU & PAUTRIZEL]. *Rev. d'Hyg. et de Méd. Sociale.* Paris. 1960, Oct.–Nov., v. 8, No. 7, 603–17, 1 map. [21 refs.] II. Diagnostic sérologique [PAUTRIZEL, BAILENGER & CAILLAU]. *Ibid.*, 618–31. **[I. Current Epidemiological Position of Distomatosis in South-West France. II. Serological Diagnosis]**

I. Distomatosis has often been reported in France. It is due to *Fasciola hepatica* contracted by eating watercress or less commonly to *Dicrocoelium dendriticum* (contracted by swallowing ants). The latter is less harmful and causes fewer clinical signs.

During 1952–57, 12 cases were reported in man in south-west France. During 1957–59, the authors circularized 139 clinicians and laboratories and were able to identify 128 cases. The cases occurred particularly in the region of the Atlantic Pyrenees, but outbreaks also occurred in Charente and Lot-et-Garonne, but not in Charente-Maritime. The clinical symptoms were varied and polymorphic, but there was constantly a leucocytosis of 15,000 per cmm., with eosinophilia of 40–70%. Complement-fixation tests were positive, with sera diluted 1 in 4 to 1 in 16. Infection was always contracted by eating watercress. Diagnosis was made from eosinophilia, serological reactions and skin tests, and was confirmed by the therapeutic response to anthiomaline or emetine. If eggs were found they were always *Fasciola* (except for one case with *Dicrocoelium*). Man appears to be an accidental and unnatural host to which *Fasciola* is not well adapted.

Examinations made at abattoirs in Bordeaux during 1946–48 showed about 2% of cattle and 0·5% of sheep to contain adult flukes. In 1954–56 about 6·6% of cattle and 0·7% of sheep contained flukes. The lower figures among sheep are due to the fact that sheep are more damaged by the flukes so that infected sheep are not fit to be sent to the abattoirs. Many animals in the abattoirs of Bordeaux come from far afield. At Pau (where only local cattle are killed) about 60% of sheep contain flukes and cattle are somewhat less frequently infected. At Anglet-Bayonne-Biarritz about 50% of sheep and 10% of cattle are infected. Some herds have lost over half their animals from infection. But the infection rate fluctuates from year to year.

Cattle are less easily killed by flukes than sheep and therefore they form a more important reservoir of infection.

*Fasciola* requires aquatic snails and aquatic plants eaten by man; *Dicrocoelium* requires moist soil, terrestial snails and insects such as ants. If watercress is not grown or eaten, distomatosis can exist in cattle without man becoming infected. The chief snails in cress farms seem to be *Lymnaea* (*Radix*) *limosa* and *Lymnaea* (*Stagnicola*) *palustris*. Attempts to demonstrate infections of these snails were unsuccessful. In an epidemic near Lyons, *L. palustris* was shown by COUDERT and TRIOZON [this *Bulletin*, 1959, v. 56, 854] to be infected with *F. hepatica*. *Lymnaea* (*Galba*) *truncatula* could not be

found. Human infection in the Atlantic Pyrenees is favoured by the abundance of running water and of cress farms, the existence of mollusc hosts and the presence of many cattle. In other regions, conditions suitable for *Fasciola* occur only sporadically. A map is given showing the areas particularly involved.

It is possible that the infection is becoming more common as watercress is eaten more frequently. At present it is eaten by townspeople, not by country people. Possibly many cases are not recognized clinically because the symptoms are abnormal, *e.g.*, one case resembled hemiplegia and another patient (a boy of 15 years) presented with intense headaches.

[This article gives a valuable review of French experience with this infection.]

II. For complement-fixation the antigen is made from flukes collected in the abattoir. They are pulped by freezing and thawing, and extracted with acetone to remove lipid. The resultant powder is preserved at −25°C. and suspended for use as 1 gm. in 100 ml. saline. It is passed through a Seitz filter and stored in ampoules. The rest of the test is done in the usual way [see original for details]. 20 sera from infected patients were tested and responded in dilutions of 1 in 4 (7 sera) to 1 in 32 (1 serum). The strength of serological reaction was not proportional to the eosinophilia. All the patients had been infected for at least 3 months. The reaction faded gradually after successful treatment with emetine. In one month the reaction fell in one patient from 1 in 32 to 1 in 4; in another patient it became negative after 5 months.

With 54 sera from control subjects, the reaction was negative. They included 13 syphilitic sera, one each from patients with ankylostomiasis, *Strongyloides* and *Taenia* and 4 from patients with schistosomiasis.

In the red cell agglutination test (conglutination reaction), the system consists of antigen as above, horse serum to provide complement and sheep red cells in cow serum. [For technical details, see original.] A positive reaction is indicated by agglutination of the red cells. Examination was made of the sera of 14 sheep which contained many *Fasciola* eggs in the stools. Nevertheless these sera were negative in the complement-fixation test, although the reason for these " false-negatives " cannot be explained. In the conglutination reaction these sera were positive in dilutions of 1 in 1 to 1 in 128. Two human sera were tested; one was positive at 1 in 8 by the complement-fixation test and at 1 in 64 by the conglutination reaction; the other was negative for both reactions. It is concluded that the conglutination reaction is more sensitive than the complement-fixation reaction. *F. Hawking*

Flores-Barroeta, L. & García-Torres, F. Un caso de fasciolosis humana en el coledoco. [**A Case of *Fasciola* Infection in the Bile Duct**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1960, Mar., v. 20, No. 1, 37–40, 1 fig. [12 refs.] English summary (6 lines).

Lagrange, E. & Gutmann, A. Sur l'infestation expérimentale de la souris par *Fasciola hepatica*. [**Experimental Infection of Mice by *Fasciola hepatica***] *Riv. di Parassit.* Rome. 1961, June, v. 22, No. 2, 93–101. [11 refs.]

The English summary appended to the paper is as follows:—

" Mice infected by mouth with a few metacercariae of *Fasciola hepatica* usually die within 4–5 weeks with severe lesions of the liver and eventually

peritoneal inundation with blood and/or bile. Small flukes sexually immature are found in the liver and in the peritoneal cavity.

"Ingestion of a single metacercaria may sometimes prove insufficient to provoke infection. When the mice survive at least 33 days, one or several flukes sexually mature may be found in the ductus choledocus.

"Thence, for an unlimited period, they emit hundreds of eggs a day which are found in the faeces or collect in the biliary vesicle, producing very slight anatomical disturbances, enlarging the ductus choledocus where they remain captive.

"The death of the mouse in such circumstances may be delayed indefinitely and is most probably due to other causes"

BRYGOO, E. R. & CATALA, P. Premier cas de sparganose humaine à Madagascar. [**First Case of Sparganosis in Man in Madagascar**] *Arch. Inst. Pasteur de Madagascar*. 1961, v. 29, 75–7.

FAIN and PIRAUX in Ruanda-Urundi reported the ninth case of sparganosis in Africa [this *Bulletin*, 1960, v. 57, 824]. The present authors describe another case in a Malagasy woman of 22 which took the form of an inflammatory growth of sudden onset on the chest. Section showed this to be a larval stage of a tapeworm, associated with a cystic cavity containing clear fluid. It is likely that this was a larva of *Diphyllobothrium erinacei europaei*, which is a frequent parasite of dogs in Madagascar and the larval stages of which are found in many animals. In the present case, the histological findings were comparable to those which the senior author with CAPRON had found in experimental infections of a lemur [*ibid.*, 1961, v. 58, 815].

*H. J. O'D. Burke-Gaffney*

FUENTES P., Beatriz, NEGRETE M., J. & VILLALOBOS P., R. Algunos factores físicos y químicos que afectan la evaginación de *Cysticercus cellulosae in vitro*. [**Physical and Chemical Factors Affecting the *in vitro* Evagination of *Cysticercus cellulosae***] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1960, June, v. 20, No. 2, 103–28, 6 figs. [20 refs.] English summary.

COHEN, A. [**A Case of Echinococcosis in the Parametrium**] *Dapim Refuiim*. Tel Aviv. 1961, May, v. 20, No. 2, [in Hebrew 191–2. English summary viii (8 lines)].

LAYRISSE, M. El metabolismo de las vitaminas B 12 y del acido folico en pacientes con Necator Americano. [**Folic Acid and Vitamin B12 Metabolism in Patients infected with *Necator americanus***] *Rev. Venezolana Sanidad y Asistencia Social*. Caracas. 1960, June & Sept., v. 25, Nos. 2/3, 244–53, 4 figs. [24 refs.]

In Venezuela ankylostomiasis is the principal cause of anaemia. The author therefore studied the metabolism of vitamin B12 and of folic acid in 5 groups of persons, 4 composed of patients and one control group. The patients all complained of debility, fatigue, pallor, reduced capacity for work, and their diet was deficient in animal protein.

The groups were made up as follows:—A and B of 8 and 13 patients respectively all with a severe *Necator* infection; group C, 5 patients with a slight *Necator* infection; D, 5 patients with anaemia but no ankylostomiasis; E, healthy controls. Tests for B12 content of the serum, plasma Fe, B12 in the urine and folic acid content were performed on all. Previous tests had shown that there was a close correlation between the number of eggs per gm. of faeces and loss of blood in ml., the figures being approximately 2·74 ml. blood loss per 1,000 ova per gm. of faeces daily [this *Bulletin*, 1957, v. 54, 1336]. The results showed that in groups A and B there was a lack of haemosiderin in the sternal marrow, low plasma Fe and lower B12 values than in normal persons. No morphological changes were found in the bone marrow and the infected patients responded to Fe treatment. Patients in groups C and D showed little if any change from normal.

The author states that the B12 level of the serum is a valuable indication of the tissue saturation and that low levels represent some disturbance of intestinal absorption, though even in groups A and B the reduced vitamin B12 may have been due to deficiency in animal protein. He feels that his results do not lead to any firm conclusions but suggests that in *Necator* infections other (nutritional) factors can affect such patients as well as the actual loss of blood.

*W. K. Dunscombe*

KRUPP, Iris M. **The Effect of *Ancylostoma caninum* Infection on Erythropoiesis in Dogs.** *Amer. J. Trop. Med. & Hyg.* 1961, July, v. 10, No. 4, 510–14, 1 fig. [15 refs.]

It has been suspected that hookworms produce a substance which suppresses bone-marrow function and thereby contributes to the anaemia which arises from haemorrhage. Radioactive iron was given to 5 normal control dogs, 6 animals experimentally infected with *Ancylostoma caninum* and 8 stray dogs who were naturally infected. The disappearance of the iron from the bloodstream and its reappearance in red cells were measured. The first, particularly, is closely similar to the iron uptake by the bone marrow, and the rate of removal of radioactive iron from the plasma provides an index of its erythropoietic activity.

The overall result was that the infected dogs showed an increased uptake of radioactive iron *i.e.*, had a raised erythropoietic activity of the bone marrow. The one exception was one experimentally infected animal with an immature infection who, 10 days after inoculation, showed a decrease in iron uptake. Otherwise the dogs all showed either a high normal or an increased iron uptake. Their haematocrits, whole blood volumes and the volume of circulating cells did not appreciably differ from those of the controls. Thus the stimulation of bone-marrow activity resulted in a compensation of blood loss by haemorrhage.

*H. Lehmann*

BIAGI F., F., NAVARRETE, F. & MARTUSCELLI Q., A. **Treatment of Ascariasis with Piperazine and a Surfactant Agent.** *Rev. Inst. Med. Trop. São Paulo.* 1961, Jan.–Feb., v. 3, No. 1, 29–30. [11 refs.]

The senior author, with RODRIGUEZ [this *Bulletin*, 1960, v. 57, 1192], has already produced evidence to support the belief that ascariasis may be

eradicated by mass treatment in a closed population and has used piperazine in those studies.

They now describe the use of piperazine with a surfactant, Tyloxapol, which was added for one set of patients to a syrup containing 100 mgm. piperazine hexahydrate per cc. in the proportion of 2 mgm. Tyloxapol per cc. of syrup. 134 patients with ascariasis, aged 6 months to adult, were treated: 114 of these were aged 2 to 14 years. 63 received a single dose of 100 mgm. piperazine per kgm. by mouth: a dose of 4 gm. was not exceeded. 83 others received the syrup supplemented with Tyloxapol. 3 faecal examinations, with egg counts, were made before treatment and 3 more 8 days after treatment. The percentage decrease in the number of eggs was the indication of the therapeutic effect.

The treatments with piperazine alone and with the added surfactant are tabulated, in terms of reduction of eggs, from elimination of about one-third to total clearance. 100% clearance was obtained in 41 of the 63 treated with piperazine only and 67 of 83 of those receiving piperazine with surfactant. These are shown respectively as 65% and 80·7% and the superiority of the combination is stated to be statistically significant ($P=0·05$). The authors cannot explain the synergic effect of the surfactant, but suggest that it may favour penetration of the drug into the parasite. *H. J. O'D. Burke-Gaffney*

Martínez Báez, M. & Alemán, P. Larva migrans visceral. Primer caso comprobado en México. I. Estudio histopatológico. [**First Confirmed Case of Larva Migrans in Mexico. I. Histopathological Study**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1960, June, v. 20, No. 2, 65–72, 2 figs. English summary (4 lines).

Molina Pasquel, C. & Díaz Muñoz, A. II. Estudio clínico. [**II. Clinical Features**] *Ibid.*, 73–80. [14 refs.] English summary (5 lines).

Manson-Bahr, P. **The Histological Pattern of Visceral Larva Migrans (Parasitic Granuloma) and its Role in Diagnosis.** *J. Trop. Med. & Hyg.* 1961, June, v. 64, No. 6, 129–36, 5 figs. [28 refs.]

Personal experience of an example of this has led the author to review the history and current knowledge of visceral larva migrans. The presenting case was that of a male from South Africa who reached London with fever, respiratory signs and leucopenia. Serological tests ultimately proved that this acute illness was due to infection with *Rickettsia burneti* (Q fever). However, features which were unassociated with this illness continued to arouse interest. These comprised hepatomegaly of some years' duration, chronic granulomata at the site of operation for gouty olecranon bursitis and a similar granulomatous lesion in the scar of an exploratory abdominal operation. Ultimately a diagnosis of visceral larva migrans was reached when a strongly positive filarial complement-fixation test [CFT] was demonstrated in the serum, an eosinophilic granuloma was found in a biopsy specimen of rectus muscle and antifilarial treatment with Banocide [diethylcarbamazine] resulted in a brisk allergic response followed by reversal of the filarial CFT.

A creeping eruption can be caused by larval forms of any of the three ankylostomes of the dog, *Ancylostoma braziliense*, *A. stenocephala* and *A. caninum*, which, though unable to mature may remain active in the subcutaneous tissues for as long as 2 years. Strongyloidiasis is often marked by auto-infection with the rhabditiform larva, which gives rise to characteristic tortuous urticarial weals on the thighs and trunk. *Gnathostoma spinigerum*, a parasite of pigs and cats, may also have a similar larval phase in the deep subcutaneous tissues of man. This phenomenon is, however, not confined to larval helminthic invasion, for similar lesions may be caused by mites, such as *Tetranychus molestissimus* in South Africa and South America and larvae of a fly of the genus *Gastrophilus* in Russia.

Systemic invasion of the body by non-human parasites, termed visceral larva migrans, is now being widely recognized. The earliest and best understood example of this condition is tropical eosinophilia in which miliary granulomata form in the lungs, lymph glands and liver. Research in Singapore [this *Bulletin*, 1957, v. 54, 1341, 1342; 1959, v. 56, 1061], India [*ibid.*, 1957, v. 54, 1471] and London [*ibid.*, 1958, v. 55, 1356] has now established that these lesions may be provoked by the presence of non-human filarial larvae, and that the disease is readily curable by diethylcarbamazine. The author, in his studies on the non-periodic *Wuchereria bancrofti* infection of the Pacific area, has demonstrated similar granulomata enclosing disintegrating microfilariae in deep lymphatic glands remote from those which contained the parent worms.

Invasion of the tissues of man by the larval stages of the dog nematode *Toxocara canis* is now being widely reported. Gross pulmonary invasion, causing death from status asthmaticus, has been reported from Malaya [*ibid.*, 1958, v. 55, 791], toxocaral encephalitis in a child has been diagnosed in the Netherlands [*ibid.*, 1960, v. 57, 928] and increasing numbers of retinal granulomata due to the same cause are being reported in America and Britain [*ibid.*, 1961, v. 58, 485]. The syndrome of febrile hepatomegaly due to massive invasion of the liver is well known, especially in the southern states of the U.S.A.

The author has studied in Fiji the mechanism of development of the parasitic granuloma. The initial process is the calcification of the dead parasite, followed by macrophage invasion and absorption of the softer tissues. Finally the calcified integument is removed and the macrophages coalesce to form large foreign-body giant cells. These are surrounded by epithelioid cells, lymphocytes and an outer zone of eosinophils. In granulomata evoked by larval *Toxocara canis* and some others capsular fragments of the parasite may persist and show up especially well under periodic-acid Schiff staining. *J. H. Walters*

OSHIMA, T. **Standardization of Techniques for infecting Mice with *Toxocara canis* and Observations on the Normal Migration Routes of the Larvae.** *J. Parasitology*. 1961, Aug., v. 47, No. 4, Sect. 1, 652–6, 3 figs.

OSHIMA, T. **Influence of Pregnancy and Lactation on Migration of the Larvae of *Toxocara canis* in Mice.** *J. Parasitology*. 1961, Aug., v. 47, No. 4, Sect. 1, 657–60, 3 figs. [15 refs.]

MONSEUR, J. Note au sujet de l'onchocercose humaine au Maniema (Province du Kivu). [**Onchocerciasis in Maniema, Congo**] *Ann. Soc. Belge de Méd. Trop.* 1961, Feb. 28, v. 41, No. 1, 57–61.

The author confirms the presence of onchocerciasis, previously only suspected, in Maniema in the Kivu province of the former Belgian Congo.

Of 185 persons examined in two villages, 125 showed clinical evidence of the disease; in 75, examination of the skin demonstrated microfilariae. Cases of blindness and ocular manifestations attributable to the disease are reported. *Simulium damnosum* is thought to be the vector.

The extent of the infected area is about 23,000 sq. km. *M. J. Colbourne*

JANZ, G. J., CASACA, V. M. R., DE CARVALHO, A. C. M. & PIRES, F. M. État actuel des connaissances sur l'onchocercose en Angola. [**Current Data on Onchocerciasis in Angola**] 13 mimeographed pp. + 22 pp. of tables, 3 folding maps & 2 graphs. [22 refs.] 1961. Nova Lisboa.

This document summarizes all the knowledge available of onchocerciasis in Angola, and in fact provides as much information on the subject as the general epidemiologist needs. There are two foci of onchocerciasis. One is in a fairly small area at the extreme north-east tip of the country, adjoining a known focus in the ex-Belgian Congo. The other includes the detached district of Cabinda, on the coast west of Léopoldville, and extends in a wide band from the north-west border in a direction approximately south-south-east to end about 250 miles east of Nova Lisboa. Its southern limit is 12° 36′ S. latitude, the most southerly point at which onchocerciasis has yet been found in Africa. Surveys have been made in nearly all other areas of the country, with negative results. The vector is *Simulium damnosum*. The only other man-biting species locally represented is *S. albivirgulatum*.

Men are infected more frequently than women. Incidence is virtually nil under the age of 5 years, and rises progressively with age to a maximum of 80% in men over 50 in one area (Salazar).

The distribution of blindness in Angola bears little relation to that of onchocerciasis, but both anterior and posterior lesions of ocular onchocerciasis have been found by three ophthalmologists who have worked in the endemic areas. *B. B. Waddy*

ABREU, M. M. M. de A. Contribuiçao para o estudo dos Simuliidae de Angola (Diptera: Nematocera). Alguns dados sobre a sua ecologia, biologia e relações com a epidemiologia da oncocercose. [**Observations on the Ecology and Biology of *Simulium* Species in Angola, with Reference to the Epidemiology of Onchocerciasis**] *Anais Inst. Med. Trop.* Lisbon. 1960, Jan.–June, v. 17, Nos. 1/2, 113–71, 4 maps, 19 figs. & 4 graphs. [12 refs.] English summary.

This paper contains a very complete illustrated account of the breeding places of *Simulium* along the Rio Úcua and its tributaries in an area north of Luanda in Angola. *Simulium damnosum* was the only anthropophilic species found

infected with *Onchocerca*, although *S. bovis* and 7 other species of *Simulium* were encountered. Notes are given on the biting habits of *S. damnosum*. Biting activity was found to fall off markedly 20–40 m. from the water although females were captured 250–400 m. from the river. The majority of females fed on the lower part of the body and peaks of biting activity were found during the day at temperatures between 27°C. and 30°C. Temperatures below 18°C. and above 40°C. appeared to inhibit biting.

A total of 1,028 females of *S. damnosum* from different localities was dissected and infection with filariae was found to vary from 0 to 12%. Of 560 human beings over 5 years of age from villages along the river system, 300 (53·57%) showed microfilariae of *Onchocerca* on examination. The distribution of these infections in the human population is given in detail in 3 tables.

*B. R. Laurence*

NETTEL FLORES, R. Contribución al estudio de la determinación del indice de infestación de Simúlidos por *Onchocerca volvulus*. [**Determination of the Index of Infection of** *Simulium* **with** *Onchocerca volvulus*] *Bol. Epidemiológico*. Mexico. 1960, Apr.–May–June, v. 24, No. 2, 42–8, 4 charts & 5 figs. [25 refs.] English summary.

The author, from Mexico, discusses previous findings of *Onchocerca* infections in *Simulium* in various parts of the world and lists some records from the literature from 1926 to 1955.

He then describes a study made on a ranch in La Concordia, Chiapas, at an altitude of 1,000 metres above sea level. The site is at the bottom of a valley and there are numerous creeks originating from neighbouring rivers. The mean temperature is 22°C. in March (the dry season) and 20°C. in July–August (the rainy season). The humidity is 80% for most of the year.

*Simulium* were captured in the mornings and afternoons on 11 days in March 1948. This was repeated 11 years later in July–August 1959. 9,387 and 9,373 *Simulium* were captured in each year respectively, and included 5 species in 1948 and 4 in 1959. The commonest were *S. ochraceum* and *S. metallicum* which amounted to 71·18% and 26·08% of the catches in 1948 and of these 13% and 7% were found infected. In 1959, they amounted to 30·64% and 68·93% of catches and the infection rates were 14% and 20%. Only 63 and 22 *S. callidum* were collected in the respective years and the infection rates were 5% and 2%. No infections were found in the other two species collected.

The results are discussed in relation to the density of *Simulium* in dry and wet seasons and the presence of large numbers of additional labourers for the coffee-harvesting season.

[See also this *Bulletin*, 1949, v. 46, 564; 1950, v. 47, 646.]

*H. J. O'D. Burke-Gaffney*

CALLE, S. **Parasitism by** *Capillaria hepatica*. *Pediatrics*. Springfield, Ill. 1961, Apr., v. 27, No. 4, 648–55, 5 figs. [28 refs.]

The author writes from Duke University School of Medicine, Durham, North Carolina. He summarizes the principal features of *Capillaria hepatica* infection,

stressing the need to distinguish genuine from spurious infections [this *Bulletin*, 1951, v. 48, 183], the ova in spurious infections being in the faeces and not in the liver as is the case in clinical infection.

After a brief reference to the literature on infections in animals, he describes the case of a Negro infant aged 20 months who had fever for 3 weeks and abdominal swelling for 5 days. There was a leucocyte count of 66,000 per cmm. with 85% eosinophils, hypochromic anaemia and hepatosplenomegaly. No parasites were found in the stools. A surgical biopsy disclosed a purplish liver with many grey scars, which were shown to be granulomata in various degrees of activity, mostly in the portal area. They contained ova characteristic of *C. hepatica* in numbers varying from 1 to 8, with the usual cellular reaction. These features are shown in 4 photomicrographs. Various laboratory tests were made and these are described. The patient was treated with dithiazanine iodide and was discharged in good condition on the 49th day. He was examined again 17 and 49 days later and was much improved except for an upper respiratory infection which responded to antibiotics in a few days. Ten months after his illness had begun, he was doing well.

There were many dogs, cats and rats in the neighbourhood, the patient's father worked in a veterinary hospital, and there was a history of eating dirt.

The author discusses the differential diagnosis with special reference to ascariasis and visceral larva migrans.

The literature is reviewed. This is the eighth case reported in man, of which 6 were in children. 4 originated in the United States, 4 were diagnosed by liver biopsy and 2 patients (including the present one) are still living. [For references see this *Bulletin*, 1951, v. 48, 183 ; 1957, v. 54, 1446 ; 1960, v. 57, 509.]

*H. J. O'D. Burke-Gaffney*

Wong Hock Boon & Tan Kwang Hoh. **Severe Whipworm Infestation in Children.** *Singapore Med. J.* 1961, Mar., v. 2, No. 1, 34–7, 3 figs.

The authors, working in the Paediatric Unit, General Hospital, Singapore, report that whipworm (*Trichuris trichiura*) infection in children is by no means always mild and symptomless. With heavy infections, chronic dysentery and blood loss, anaemia, abdominal pain and tenesmus, ulceration of the rectal and colonic mucosa, and prolapse of the rectum may occur. [This has also been reported from Ceylon (see this *Bulletin*, 1961, v. 58, 493) and from South Africa (Winship and Hennessy, *South African Med. J.*, 1959, v. 33, 354).]

20 such severely infected children were studied. They were all between 2 and 5 years of age, and had had symptoms for 6 months to 2 years. 50% had a haemoglobin below 8·8 gm.%, and 35% below 6 gm.%. 70% had rectal prolapse on admission. In 90% bleeding ulcers were seen on sigmoidoscopy.

Their anaemia was treated by iron or transfusion, and the worm infection by dithiazanine iodide for 5 days. 100 mgm. a day was given to those weighing 10–20 lb., 200 mgm. to those of 20–30 lb., and 300 to those of 30–40 lb. The drug was given in three divided doses after meals, without starvation or purgation.

Symptoms improved by the third day, rectal prolapse had disappeared by the fifth day, and sigmoidoscopy on the sixth day revealed healing ulcers and absence of adult worms. In 8 patients where ova counts were done before and

after treatment there was complete clearing in 2 and a dramatic drop in all—from an average of 21,325 per cmm. of faeces before treatment to an average of 625 per cmm. afterwards. All patients remained well for 6 months except 2, who were effectively dealt with by a further course of dithiazanine, and were probably reinfections rather than relapses. *A. C. E. Cole*

KEELING, J. E. D. **Experimental Trichuriasis. I. Antagonism between *Trichuris muris* and *Aspiculuris tetraptera* in the Albino Mouse.** *J. Parasitology.* 1961, Aug., v. 47, No. 4, Sect. 1, 641–6. [12 refs.]

MATHIES, A. W., Jr. *Enterobius vermicularis* **Infection. Certain Aspects of the Host-Parasite Relationship.** *Amer. J. Dis. Children.* 1961, Feb., v. 101, No. 2, 174–7, 1 fig. [12 refs.]

The author studied the effects of treatment of *Enterobius vermicularis* infection in children in an orphanage from two aspects. He checked the efficacy of two different dosage schedules of piperazine; also he investigated the question of whether the sex and age of the host influenced the degree of infection. Previous work with mouse pinworm had indicated that with these the degree of infection decreased with age and was heavier in male mice.

Out of 94 children, 47 were found to be infected on a single tape examination. These were treated with a standard 7-day course of piperazine citrate syrup (Antepar), daily dosage varying from the equivalent of ¼ gm. for those under 15 lb. up to 2 gm. for those over 60 lb. Test of cure was the finding of 7 consecutive negative daily tapes; this test was also applied to those previously found negative on a single tape examination. All stools were emulsified in formalin, passed through graded mesh screens, and the total number of worms passed were counted.

Only 5 of the 47 children treated failed to be cleared on this stiff test, a cure rate of 89%. No difference was found between boys and girls in the percentage infected, nor in the total worm load, but there was a lower percentage infection in the older girls, and a lower number of worms in all the older children.

The 5 failures on the first dosage schedule, and 36 others who were found to be infected after all on the further examinations, were treated by 2 large doses of piperazine (5 gm. equivalent) at a 7-day interval. In 14 of these there were unpleasant reactions: headache, dizziness, nausea, and vomiting. 8 were still not cleared of their infection.

The author considers that this method is no more effective, and that its side effects make it undesirable. *A. C. E. Cole*

LONDON, S. J. **A New Single-Dose Piperazine Preparation for the Treatment of Enterobiasis. (A Preliminary Report.)** *Current Therap. Res.* New York. 1961, June, v. 3, No. 6, 276–80. [15 refs.]

Piperazine is recognized as probably the most effective drug for the treatment of threadworm infection, but there is a continual effort to replace the standard 6-day course by a single dose method.

The author reports on his results with a piperazine and standardized senna (Senokot) combination, which has been reported upon favourably already [KAGAN, this *Bulletin*, 1961, v. 58, 494].

57 patients (51 children and 6 adults) with *Enterobius* infection were treated. 27 of these were given a higher dosage; 7·8 gm. of the preparation containing 3 gm. piperazine phosphate and 22·5 mgm. sennosides for those under 6 years of age, 10·4 gm. preparation containing 4 gm. piperazine phosphate and 30 mgm. sennosides for those over 6 years of age. Complaints of griping and diarrhoea led to a reduction in dosage, and the remaining 30 patients were given 5·2 gm. (2 gm. piperazine) and 7·8 gm. (3 gm. piperazine) for the younger and older respectively.

A week after treatment 7 consecutive daily swabs were examined for ova as a test of cure. Of the 57 patients 54 (95%) were cured, both higher and lower dosage appearing equally effective. Diarrhoea and griping were reported in 5 of the 27 (18·5%) on the higher dosage, and 2 of the 30 (6·6%) on the lower. The children took the preparation well, given as granules mixed with chocolate milk. *A. C. E. Cole*

HOLGERSEN, P. B. Trikinose i Upernavik vinteren 1959–1960. [**Trichinosis at Upernavik in the Winter of 1959–1960**] *Nordisk Med.* 1961, Aug. 3, v. 66, No. 31, 1089–93, 8 figs.

The English summary appended to the paper is as follows:—

"A report is given of an epidemic of trichinosis in Greenland, affecting 56 persons of whom 24 had to be admitted to hospital. No death occurred. The principal treatment in the most highly oedematous cases was by blood-transfusion or infusion of 10% macrodex combined with rontyl tablets (hydroflumethiazide BAN)."

FERRANTI, G. Epidemiologia e profilassi della trichinosi. (Rassegna sintetica.) [**Epidemiology and Prophylaxis of Trichiniasis**] *Nuovi Ann. d'Igiene e Microbiol.* 1961, Jan.–Feb., v. 12, No. 1, 1–14. [Numerous refs.] English summary (6 lines).

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## DEFICIENCY DISEASES

THOMSON (Lady). **Malnutrition in the Tropics.** *Practitioner.* 1961, Aug., v. 187, No. 1118, 173–81. [39 refs.]

A general survey with discussion and reference to the literature.

RAO, B. R. H., KLONTZ, C. E., RAO, P. S. S., ALMAS BEGUM & DUMM, M. E. **Nutrition Status Survey of the Rural Population in Sholavaram. Seasonal Dietary Survey.** *Indian J. Med. Res.* 1961, Mar., v. 49, No. 2, 316–29. [20 refs.]

Sholavaram, an agricultural village in South India, had previously been the location of a medical nutritional survey [this *Bulletin*, 1961, v. 58, 496]. Since the purpose of the present investigation was to establish a basis for planning a practical nutrition programme, special attention was given to the study of living habits and dietary patterns.

Out of a total of 519 families, 111 were selected at random and questioned on the availability of food, its storage, methods of cooking and consumption. A detailed quantitative study was carried out on a sub-group of 20 families considered to represent a fair sample of the population. The food intakes of these families were recorded during each of the four seasons: (1) January–March, (2) April–June, (3) July–September, (4) October–December.

The diets of the villagers consisted largely of the staple cereals—parboiled rice, cholam (*Sorghum vulgare*) and ragi (*Eleusine coracana*) with relatively small additions of various pulses and vegetables. The intake of fish, meat, eggs and milk was virtually negligible. There were some important seasonal variations: rice was eaten in large quantities in seasons (1) and (4) while ragi was more important in season (2) and cholam in season (3); red gram (*Cajanus cajan*), the chief pulse throughout the year, was most plentiful at the time of harvesting in season (1). Vegetables varied in quantity and kind, being available in the largest quantities from January to June.

Analysis of the diets showed them to be deficient in both quantity and quality. Daily *per caput* consumption of calories was 50–75% of the recommended allowance (FAO) [*Bull. Hyg.*, 1958, v. 33, 59], 81–88% of these being supplied by carbohydrate and only 6–12% by fats of vegetable origin. Average protein intakes, mainly from cereals and pulses, ranged from 34 to 44 gm. per head per day. Almost all individual intakes were below 75% of the recommended allowance and the majority below 50% for the greater part of the year. Intake of vitamin A, riboflavine and iron was also extremely low. Men were stated to obtain the best of the diet. When there was not enough food for all, the women, particularly older women, went short. No additional foods were available for pregnant or lactating mothers. *Ruth Schwartz*

POTGIETER, G. M., SMYTHE, P. M. & KENCH, J. E. **Serum Proteins in Kwashiorkor.** *South African Med. J.* 1960, Oct. 1, v. 34, No. 40, 841–2, 1 fig.

The starch-gel electrophoretic pattern of the serum proteins of 11 children suffering from kwashiorkor was studied before and during treatment. Reappearance of proteins previously absent or deficient showed no consistent sequence during treatment, although an improvement in the electrophoretic pattern invariably accompanied signs of clinical recovery. The converse was not always true and in some cases death ensued in spite of an apparent improvement in the electrophoretic pattern.

Electrophoresis of oedema fluid showed that most of the protein was albumin, and in 1 child the total albumin contained in oedema fluid was estimated to be about 12 gm.; the return of even a part of this to the circulating blood could have an appreciable effect on the serum proteins. *W. P. Stamm*

SÉNÉCAL, J. & DAN, V. Le test de la sueur chez l'enfant noir. [**The Sweat Test in African Children**] *Bull. Soc. Méd. Afrique Noire Langue Française*. Dakar. 1961, v. 6, No. 1, 81–91, 3 figs. [36 refs.]

SÉNÉCAL *et al.* [this *Bulletin*, 1955, v. 52, 394] found that 2 West African children, who died with fibrocystic disease of the pancreas, showed clinical signs practically indistinguishable from those of kwashiorkor. The clinical appearances are associated with hypoproteinaemia, caused in kwashiorkor by a lack of provision of protein, and in fibrocystic disease of the pancreas by a failure in its utilization.

A total of 283 standardized sweat tests were performed on 150 African children, mostly under 2 years of age. Sweating was induced by putting the children to bed with the addition of 2 extra blankets. The test was limited to 40 minutes, and sweat was collected from the forehead (LESTRADET *et al.*, *Arch. Française de Pédiatrie*, 1954, v. 16, 475). Sweat production and the concentration of sweat chlorides were measured.

In 69 normal controls, sweat production showed such great individual variability, varying greatly from time to time in the same child, that even seasonal differences were not apparent. The chloride content, though total observations covered a wide range, showed no such differences in repeated tests on the same child. The mean chloride concentration was 32 mEq./litre $\pm \sigma = 6{\cdot}7$, ranging from 16–50 mEq./litre. These findings are similar to those reported elsewhere in white children.

In 68 tests on 41 children with kwashiorkor no abnormality in sweat production was demonstrated, but the mean chloride concentration was markedly reduced—16 mEq./litre $\pm$ 1·5 with a range of 11–22 mEq./litre. This finding is in marked contrast to the increased concentration of sweat chloride which is diagnostic in fibrocystic disease of the pancreas (50–160 mEq./litre).

In 49 tests on 32 children suffering from marasmus the range of sweat chlorides was 17–78 mEq./litre, the mean being 42 mEq./litre $\pm$ 14·2, rather higher than that in normal controls. The great variation may be due to the prevalence of many cases intermediate between kwashiorkor and marasmus; the serum-protein values were also very variable, some being as low as those in kwashiorkor. A correlation between the serum-protein values and the concentration of sweat chlorides was demonstrated.

In 8 children with sickle-cell anaemia, repeated tests on each child showed markedly reduced sweat production—0·0821 gm.–0·0015 gm. in 40 minutes compared with findings in normal controls of 0·1780 gm.–1·7993 gm. The quantities of sweat were too small for chloride analysis. This suggestive finding requires further investigation.

The contrasting findings in kwashiorkor and fibrocystic disease of the pancreas, though not yet understood, provide a useful test for the differential diagnosis of the two diseases. *T. P. Eddy*

REID, D. H. S. **Acute Infantile Beriberi.** *J. Pediatrics*. St. Louis. 1961, June, v. 58, No. 6, 858–63, 1 fig. [15 refs.]

Beriberi has occurred fairly frequently in the families of Gurkha troops stationed in Hong Kong. In particular it can appear as an acute disease in

infants. The author describes 4 successfully treated infants, and states that many others have died suddenly before being brought to treatment.

The 4 infants were of 6–12 weeks of age, and were breast-fed and well nourished. There were few premonitory symptoms, the children being previously well or at the most having slight gastro-intestinal upset. They then became acutely ill, semi-comatose with hypotonia of the limbs but with normal reflexes, and exhibited dyspnoea, tachycardia, and slight cyanosis with a curious grunting expiration. Treatment consisted of stopping breast feeding, giving parenteral thiamine, and using oxygen and antibiotics. Response was rapid and diagnostic, recovery occurring in a matter of hours.

Evidence for thiamine deficiency as the cause consisted partly of the specific response to the vitamin. In one case the mother's blood was estimated for its pyruvic acid content, and a level of 1·84 mgm. per 100 ml. found (normal 0·5 mgm.–1·0 mgm.); the blood thiamine level was also determined and was found to be 4·1 μgm. per 100 ml. (normal average 5·7 μgm.).

12 months ago prophylactic thiamine was given to all Gurkha mothers and infants, and since then only one case of beriberi has occurred (where in fact the vitamin had not been taken). Previously as many as 12 deaths a year had occurred. The reason for this high incidence appeared to be that Gurkha mothers tend to stop eating anything except highly polished rice during lactation, thinking that other foods may cause gastro-intestinal upsets in the infant. It is not clear why the mothers do not have overt symptoms of the deficiency.

*A. C. E. Cole*

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## HAEMATOLOGY

KARIKS, J. & HIPSLEY, E. H. **Serum Protein Levels in Mothers and New-Born Infants—a Comparison of New Guineans with White Australians.** *Med. J. Australia.* 1961, June 10, v. 1, No. 23, 853–6. [26 refs.]

"1. Determinations of serum protein fractions separated by paper electrophoresis were made on samples of serum obtained from 38 New Guinean women and their new-born infants and from 21 Australian women and their new-born infants.

"2. Compared with Australian women, the New Guinean women were found to have in their sera a greater concentration of gamma globulin, together with a smaller concentration of albumin.

"3. Compared with Australian new-born infants, the sera of the New Guinean infants showed a greater concentration of gamma globulin, but no significant difference was shown between the albumin concentrations in the sera of the New Guinean and Australian infants.

"4. The mean concentration of gamma globulin in the sera of the Australian infants was not significantly different from the mean concentration found in the mothers. By contrast, the mean concentration of the group of New Guinean infants was significantly less than the mean level for the mothers."

Bradfield, R. B., Dias T., C. & Collazos Ch., C. Valores de cobre plasmático en escolares parasitados de la Hoya Amazónica. [**Plasma Copper Levels in Children with Parasitic Infections in the Amazon Basin**] *Archivos Venezolanos de Nutricion*. 1960, Jan., v. 10, No. 1, 23–8. [13 refs.]

The English summary appended to the paper is as follows:—

"Plasma copper levels were measured in 138 parasitized schoolchildren, 7–13 years of age, living in the Amazon Basin. A mean of 150 ± 31 μg.% was obtained with a range of 90–255 μg.%. These results were in agreement with other authors who have reported hypercupremia in cases of malnutrition, chronic infection, and iron deficiency."

Paviot, J. J., Nioguy, C., Labie, D. & Santhanagobalam. L'anémie tropicale dans le Sud de l'Inde. [**Tropical Anaemia in South India**] *Bull. Soc. Path. Exot.* 1960, July–Aug., v. 53, No. 4, 711–22.

This report from the Medical College, Pondicherry, South India, is of clinical and haematological findings in 50 anaemic patients over the age of 12 years: 27 males and 23 females. Anaemia believed to be due to malnutrition is very common in all age-groups though at puberty females outnumber males. The point is made that pregnancy is perhaps of less significance in causing anaemia than is another mouth to feed which depresses still further the low economic status of the family. Oedema and even anasarca are common presenting complaints, and swollen ankles are more likely to cause these patients to seek medical help than is shortness of breath or lethargy. Some degree of hepatomegaly is common, and increase in the cardiac shadow on radiology of the chest is fairly common. In some the authors believe that pericardial effusion is the cause, and in some cardiac beriberi. Angina did not occur despite the finding of electrocardiographic evidence of coronary insufficiency in 2 patients. Apart from faintness in the erect position usually associated with a red cell count of less than 1 million per cmm. of blood, the authors did not find changes in the nervous system.

The limits imposed by lack of technical help and adequate laboratory facilities prevented detailed haematological studies. Marrow aspiration was a procedure likely to scare away the patients. The anaemia is markedly hypochromic and microcytic with anisocytosis and poikilocytosis. 4 patients showed very small and quite large red cells in about equal proportions, and this dimorphism, less clearly defined but present in many other patients, is not demonstrated by calculation of the mean cell volume.

The authors list various possible causes of anaemia only to dismiss them as irrelevant in their patients: kala azar, haemoglobinopathies, pernicious anaemia. One case of malarial infection and one possible case of sprue are mentioned.

43 of the 50 patients had hookworm eggs in their faeces, but the authors estimated the number of eggs per gm. of faeces and deduce that only 10 of 48 patients were clearly suffering from hookworm anaemia. [The significance of hookworm infection as a cause of anaemia, and the uncertainty of relating egg counts to number of worms have been discussed recently: this *Bulletin*, 1961, v. 58, 712.] The conclusion reached by these workers is that their anaemic

patients suffer from multiple deficiencies: iron, folic acid, and protein, and that when these are given a good response is to be expected in about 3 weeks.

*S. Bell*

See also p. 1273, KRUPP, **The Effect of *Ancylostoma caninum* Infection on Erythropoiesis in Dogs.**

GRECH, J. L., CACHIA, E. A., CALLEJA, F. & PULLICINO, F. **Hereditary Elliptocytosis in Two Maltese Families.** *J. Clin. Path.* 1961, July, v. 14, No. 4, 365–73, 9 figs. [38 refs.]

"The findings in two elliptocytic families are recorded and compared. It is the first report of the anomaly in the Maltese population.

"A variable degree of clinical and haematological expression among the members of the two families has been observed, ranging from healthy individuals with normal cell morphology to others with only elliptocytic erythrocytes and mild anaemia.

"Two subjects have been studied during anaemic crises, and are considered to represent the homozygous state."

FRASER, I. D. & RAPER, A. B. **Solubility of Denatured Haemoglobin Variants in Acid Buffers.** *Nature.* 1961, July 22, v. 191, 355–6, 4 figs.

After blood smears of newborn children are fixed with methyl alcohol, incubated at 37°C. in 0·17 molar phosphate-citrate buffer for 1½ minutes, washed, and then stained with eosin, the degree of staining varies from erythrocyte to erythrocyte. Some appear merely as ghosts and others are fully stained. The first are considered to be of the adult type and the second to contain foetal haemoglobin (KLEIHAUER *et al.*, *Klin. Woch.*, 1957, v. 35, 637). In the present paper evidence is brought to show that foetal haemoglobin in fact is not as soluble after denaturation as adult haemoglobin. In addition to foetal haemoglobin the authors find sickle-cell haemoglobin also to appear in red cells stained by this method. Furthermore much more haemoglobin remains insoluble and becomes stained in case of thalassaemia than can be accounted for by the trace of haemoglobin F which is present. The authors suggest that this finding lends support to the theory that in thalassaémia an abnormal haemoglobin may be formed which is indistinguishable by electrophoretic and other current methods from normal adult haemoglobin. *H. Lehmann*

HUISMAN, T. H. J., PUNT, K. & SCHAAD, J. D. G. **Thalassemia Minor associated with Hemoglobin-$B_2$ Heterozygosity. A Family Report.** *Blood.* 1961, June, v. 17, No. 6, 747–57, 6 figs. [19 refs.]

"1. In 14 members of 26 cases of a family originating from Surinam a double heterozygosity (for thalassemia and for the abnormal minor component Hb-$B_2$) was demonstrated. Thalassemia heterozygous carriers or individuals heterozygous for the Hb-$B_2$ abnormality alone were not encountered.

"2. The diagnosis of thalassemia minor was based on hematologic data. The abnormal minor Hb-component present in these cases was identified using the conventional electrophoretic and chromotographic technics and the fingerprinting method as being Hb-$B_2$ (an abnormal Hb-$A_2$). The percentages of the two minor Hb-fractions (Hb-$A_2$ and Hb-$B_2$) in these thalassemia heterozygous carriers are doubled, their sum being similar to the high level of Hb-$A_2$ typical for most cases of thalassemia trait.

"3. The genetic relationship between thalassemia minor (genotype: tT) and Hb-$B_2$ heterozygosity (genotype: $A_2/B_2$) is discussed. The data on this pedigree are suggestive of a close linkage of the t-T and $A_2/B_2$-loci."

MacIver, J. E., Went, L. N. & Irvine, R. A. **Hereditary Persistence of Foetal Haemoglobin: a Family Study suggesting Allelism of the F gene to the S and C Haemoglobin Genes.** *Brit. J. Haematol.* Oxford. 1961, July, v. 7, No. 3, 373–81, 4 figs. (1 on pl.). [17 refs.]

Cabannes, R., Matheron, J. & Peuch, P. Hemoglobine C-thalassémie maladie. [**Haemoglobin C-Thalassaemia Disease**] *Algérie Méd.* 1960, June, v. 64, No. 6, 543–51, 1 fig. [54 refs.]

A case in an Algerian child of 11 and family study.

Khaleque, K. A. **Haemoglobin E, Thalassaemia, and their Combination in a Muslim Family of East Pakistan.** *J. Trop. Med. & Hyg.* 1961, July, v. 64, No. 7, 171–4. [22 refs.]

Haemoglobin E is found in Bengal which is racially and geographically linked with East Pakistan. Thus it is most interesting that haemoglobin E has now been described in East Pakistan where it was discovered in association with thalassaemia. A large Muslim family has been investigated; the father was a haemoglobin AE heterozygote and the mother had thalassaemia minor. Two of the children had thalassaemia-haemoglobin-E disease. *H. Lehmann*

Marchal, G., Bilski-Pasquier, G., De Grouchy, J., Combrisson, A. & Déplanté, R. Sur un cas de thalasso-drépanocytose (maladie de Silvestroni et Bianco). Étude des hémoglobines et de la génétique. Splénectomie. [**A Case of Microdrepanocytic Disease, with Haemoglobin and Genetic Studies and Splenectomy**] *Rev. d'Hématologie.* 1960, Aug.–Oct., v. 15, No. 4, 291–306, 6 figs. [34 refs.]

A case in a Sicilian aged 20.

Aksoy, M. **Hemoglobin S in Eti-Turks and the Allewits in Lebanon.** *Blood.* 1961, May, v. 17, No. 5, 657–9. [12 refs.]

The Eti-Turks have the highest incidence of sickling in the white race [this *Bulletin*, 1955, v. 52, 571] and it is claimed that they and the Allewits of Syria

and Lebanon may have the same racial background [*ibid.*, 1956, v. 53, 1166; 1959, v. 56, 208].

The author accordingly examined 691 persons from different areas in Southern Turkey, in addition to previous studies [*loc. cit.*] and found the sickling incidence among Eti-Turks to average 16·8%, though there was considerable variation, even from village to village. Among Allewits from Lebanon the incidence was only 4%, and this low figure was equalled by Eti-Turks in only one area in Southern Turkey.

Since the Eti-Turks probably emigrated from Syria and Egypt their haemoglobin S might be of African origin, though other ethnological factors do not support this assumption. The suggestion is also made that Veddoids from India [*ibid.*, 1952, v. 49, 1152] or Greeks and Italians [*ibid.*, 1954, v. 51, 719] among whom there is a notable incidence of sickling cell genes may have mixed with the Eti-Turks in the past since " for centuries the Middle East has been the crossroads of trade, war and emigration by different races ".

*H. J. O'D. Burke-Gaffney*

HAGGARD, Mary E. & SCHNEIDER, Rose G. **Sickle Cell Anemia in the First 2 Years of Life.** *J. Pediatrics.* St. Louis. 1961, June, v. 58, No. 6, 785–90, 2 figs. [18 refs.]

In the natural history of sickle-cell anaemia there was a void; not in Africa, as the selection of Sir Samuel Baker's famous words for paraphrasing might suggest, but in America, where the evolution of the disease in the early years of life had been poorly documented. This paper goes a considerable way towards filling the void, and it shows that in America the disease evolves in a manner corresponding more to the African reports than to textbook descriptions.

It is based on 54 Negro children with homozygous sickle-cell anaemia. In 26 of these children the disease was diagnosed under the age of 2 years, and in the remaining 28, 14 had had symptoms before the age of 2. 29 children—over 50% of the total—had had symptoms before the age of 12 months; and 25 of the 54 children showed osteopathy of the metacarpals or phalanges before the end of the second year. This is a new aspect of the disease in America. [There is no mention of any mortality, and it must be presumed that this was absent or very low, which remains a distinction from the disease in Central Africa, with West Africa occupying an intermediate position.]

Data are given of the development of the anaemia in 2 sibs of a known sufferer, who were followed from birth. In one, symptoms first appeared at 22 months, when the Hb F level, which had fallen slowly, had reached 10%. In the other, symptoms appeared at 6 months, when the Hb F, which fell more rapidly, had reached 23%. The authors do not think that there is any close relationship between the Hb F level and the liability to symptoms.

4 children with considerable splenomegaly had low platelet counts (under 81,000 per cmm.). Only 1 showed a slight tendency to bleed; his platelets numbered 19,000 per cmm.; on treatment with corticotrophin they remained " well below 100,000 ", but after splenectomy the number increased to 500,000. When thrombocytopenia was detected, all these children were in a sickle cell " crisis ", and it is thus doubtful whether the low platelet count was caused by

the presence of a spleen larger than usual, or by the same factor that precipitated the "crisis". [Because of the experience in Jamaica (this *Bulletin*, 1961, v. 58, 1063), indicating the importance of hypoplastic crises, and because of the partial response to corticotrophin, it would seem that the latter view was quite tenable.] *Alan B. Raper*

SUBHEDAR, B. J., BHARGAVA, H. S., CHOUBEY, B. S. & SOLANKI, B. R. **Sickle Cell Anaemia in Adolescents and Adults.** *J. Ass. Physicians India.* 1961, July, v. 9, No. 7, 491–9, 5 figs. [13 refs.]

An account of 12 cases in Mahars in Nagpur.

HILKOVITZ, G. & MARTIN, W. W., Jr. **Sickle-Cell Anemia. Comment on Diagnosis and a Report on Splenectomy in Two Sisters.** *Arch. Intern. Med.* 1961, July, v. 108, No. 1, 109–13. [20 refs.]

MCCURDY, P. R., PEARSON, H. & GERALD, P. S. **A New Hemoglobinopathy of Unusual Genetic Significance.** *J. Lab. & Clin. Med.* 1961, July, v. 58, No. 1, 86–94, 6 figs. [25 refs.]

"A 47-year-old Negro man is described whose hemolysate contains 4 major hemoglobin components. By starch and agar electrophoresis, recombination experiments, and 'fingerprinting' technique, these components are (1) normal hemoglobin $A_1$, (2) a new variety of hemoglobin D (alpha chain abnormal), (3) hemoglobin C (beta chain abnormal), and (4) a hybrid of hemoglobins D and C (alpha and beta chains abnormal). The subject had a mild, slightly uncompensated hemolytic anemia to which no symptoms were attributable. The biochemical data concerning his hemoglobin are compatible with the hypothesis that synthesis of alpha and beta chains is under the control of at least 2 separate genes, but the combination of these chains to form the whole globin portion of the hemoglobin molecule is governed more by biochemical than genetic laws."

RIGAS, D. A. & KOLER, R. D., with the technical assistance of G. CUMMINGS, Marie L. DUERST, D. R. MALM, Katherine SWISHER & Patricia VANBELLINGHEN. **Decreased Erythrocyte Survival in Hemoglobin H Disease as a Result of the Abnormal Properties of Hemoglobin H: the Benefit of Splenectomy.** *Blood.* 1961, July, v. 18, No. 1, 1–17, 7 figs. (2 coloured). [32 refs.]

See this *Bulletin*, 1956, v. 53, 649.

SUBHEDAR, B. J., BHARGAVA, H. S., CHOUBEY, B. S. & SOLANKI, B. R. **Haemoglobin J in a Harijan Family in Nagpur.** *J. Ass. Physicians India.* 1961, July, v. 9, No. 7, 501–5, 4 figs.

See this *Bulletin*, 1959, v. 56, 89.

LAMBOTTE-LEGRAND, J., LAMBOTTE-LEGRAND, C., AGER, J. A. M. & LEHMANN, H. L'hémoglobinose P. A propos d'un cas d'association des hémoglobines P et S. [**A Case of Associated P and S Haemoglobins**] *Rev. d'Hématologie*. 1960, Jan.–Mar., v. 15, No. 1, 10–18, 4 figs. [30 refs.]

A case in an African in the Congo. See this *Bulletin*, 1960, v. 57, 1103.

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## VENOMS AND ANTIVENENES

NEDJALKOV, S. & NASHKOWA, O. Elektrophoretische und chromatographische Untersuchungen des Giftes der bulgarischen Kreuzotter (*V. ammodytes ammodytes*). [**Electrophoretic and Chromatographic Analysis of the Venom of the Bulgarian Viper** (*V. ammodytes ammodytes*)] *Zent. f. Bakt.* I. Abt. Orig. 1961, v. 182, No. 2, 261–7, 4 figs. [11 refs.]

The English summary appended to the paper is as follows:—

"The authors carried out electrophoretic, immunoelectrophoretic and chromatographic analyses of the venom of the Bulgarian V. ammodytes ammodytes and found that this venom contains 10 different fractions, 2 of which have the characteristics of glycoproteids, while the rest are proteins. Not even one of the fractions shows oxydase activity and the characteristics of lipoproteids. Lyophilization denaturizes certain protein fractions.

"Some of the fractions are inhomogenous in their immunologic behaviour and at least 19 precipitation-lines are obtained. Immunoelectrophoresis in 2 directions as compared with immunoelectrophoresis in one direction does not result in a higher number of fractions obtained. There exist interrelations between the number of fractions and the titer of the immune-serum applied.

"16 different amino-acids were identified within the venom. Methionine is found there in abundance. The latter also includes all the acid fractions, which are contained in the venom."

RUSSELL, F. E. & EMERY, J. A. **Effects of Corticosteroids on Lethality of *Ancistrodon contortrix* Venom.** *Amer. J. Med. Sci.* 1961, Apr., v. 241, No. 4, 507–11. [12 refs.]

Mice were injected intraperitoneally or subcutaneously with 1 or 2 median lethal doses of copperhead (*Ancistrodon contortrix*) venom. A single dose of methylprednisolone (5 to 100 mgm./kgm.) or hydrocortisone (5 to 500 mgm./kgm.) was given mixed with the venom, or was injected at the same time in a different area, or was given 15 minutes after the venom or sometimes before it. Multiple doses of corticosteroid were not given.

Methylprednisolone did not protect against the lethal action of the venom and in some experiments appeared to enhance it. Hydrocortisone was also devoid of protective action in almost all the experiments. At a dose of

100 mgm./kgm. hydrocortisone apparently had a slight protective action [but from the table of results it is not clear whether a control group of mice were injected with venom alone on the same occasion for comparison].

*L. G. Goodwin*

CORNEJO DONAYRE, A. Investigaciones sobre patología tropical en el Departamento de Madre de Dios. II. Serpientes venenosas. [**Studies on Tropical Pathology in the Department of Madre de Dios, Peru. II. Venomous Snakes**] Reprinted from *An. Facul. de Med.* Lima. 1960, June, v. 43, No. 2, 409–18, 11 pls. [13 refs.] English summary.

OKONOGI, T., HOSHI, S., HOMMA, M. & IIZUKA, H. **Experimental Histopathological Studies on the Serum Therapy against *Habu*-Snake Bite.** *Gunma J. Med. Sci.* Maebashi. 1961, Mar., v. 10, No. 1, 46–58, 9 figs. [Numerous refs.]

FREIRE-MAIA, L. & FERREIRA, M. C. Estudo do mecanismo da hiperglicemia e da hipertensão arterial, produzidas pelo veneno de escorpião, no cão. [**Mechanism of Hyperglycaemia and Arterial Hypertension in Scorpion Poisoning in the Dog**] *Mem. Inst. Oswaldo Cruz.* 1961, Apr., v. 59, No. 1, 11–22, 5 figs. [20 refs.] English summary.

BETTINI, S. Indagine sui casi di latrodectismo verificatisi negli anni dal 1938 al 1958 in alcune province d'Italia. Nota IV. Provincia di Latina. [**Survey of the Cases of Latrodectismus which occurred during the Years from 1938 to 1958 in some Provinces of Italy. Note IV. The Province of Latina**] *Riv. di Parassit.* Rome. 1961, June, v. 22, No. 2, 137–47, 5 figs.

The English summary appended to the paper is as follows:—

"The epidemiological data on latrodectismus in the Province of Latina during the years 1938–58 show that:

"1) The 'highly probable' + 'probable' latrodectismus cases are 222, with a sex-ratio always in favour of males. 2) The cases were reported mainly from the coastal zone of the Province, the highest frequency being at Latina's hospital. 3) The frequency of cases shows a considerable increase *a*) during the years 1946–48, with the highest peak in 1947, *b*) in the groups of age with maxima at 22·5 and 37·5 years for males, and at 20 and 32·5 for females, and *c*) during the months of June–August, with the highest peak in July for males, and during the months of June–September, with the highest peak in July–August for females. 4) A period of 2 days hospital stay is most frequent. 5) No lethal cases of latrodectismus are reported."

[See this *Bulletin*, 1961, v. 58, 845.]

## TOXOPLASMOSIS

GRICHENER, E., FERRER, R. & DE SARACUT, Ana H. Toxoplasmosis en la República Argentina. 1. Estudios epidemiológicos con toxoplasmina. **[Toxoplasmosis in Argentina. I. Epidemiological Studies with Toxoplasmin]** *Semana Méd.* 1961, Mar. 9, v. 118, No. 11, 443–5, 2 figs. [21 refs.]

The authors report the results of a survey of toxoplasmosis carried out in Argentina with the aid of the toxoplasmin test. Among 45 healthy persons (students and staff of the Department of Microbiology and Parasitology in Rosario), between the ages of 18 and 22, 18 (40%) reacted positively. They included 33 men (13 = 39·3% positive) and 12 women (5 = 41·6% positive). In 252 cases, comprising hospital patients and abnormal or retarded children from a special school, 67 (25·5%) showed positive reactions. These cases comprised 157 males and 95 females in whom positive results were obtained in 26·1 and 27·3%, respectively. Among 76 patients suffering from tuberculosis positive reactions were obtained in 22 (28·8%): this figure is lower than that for other groups. Among 55 children showing abnormalities and retarded development the reaction was positive in 14 (31%): this figure was higher than in other children. Of 45 adults with psychosis, 20 (44·4%) were positive. The percentage of positive reactions in various age-groups was as follows: 0–4=nil, 5–9=2·2%, 10–14=36·9%, 15–20=33·3%, 21–30=26·0%, 31–40=42·9%, 41–50=33·3%, 51–60=45·5%, over 60=52·4%. *C. A. Hoare*

PANDE, P. G., SEKARIAH, P. C. & SHUKLA, R. R. **Toxoplasma from the Woodpecker, a New Natural Host.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1961, May, v. 55, No. 3, 277–83, 1 fig. [Numerous refs.]

The authors record the isolation in India of *Toxoplasma gondii* from new avian hosts, the woodpeckers *Dryobates himalayensis* and *D. auriceps*, 4 out of 16 of which proved to be infected. The strain in question was inoculated into mice, in which the infection initially produced no symptoms, while parasites were detected in the 3rd passage.

In subsequent passages the virulence of the strain increased, until it killed 60–100% of the mice. Morphologically the woodpecker parasite was similar to the human strain, but was less virulent to mice. Serologically the avian strain was also like the human, but antibodies could not be detected in the birds themselves by any of the tests employed (dye test, complement fixation, haemagglutination).

The food habits of woodpeckers indicate that the vector of toxoplasmosis in these birds might be insects. *C. A. Hoare*

COOK, I. & DERRICK, E. H. **The Incidence of Toxoplasma Antibodies in Mental Hospital Patients.** *Australasian Ann. of Med.* 1961, May, v. 10, No. 2, 137–41, 1 fig.

Complement-fixation and dye tests for antibodies against *Toxoplasma gondii* were carried out in the sera from 342 inmates of a mental hospital in Queensland where *Toxoplasma* infections are common [this *Bulletin*, 1960, v. 57, 1108].

The main object of the survey was to find out whether there was any evidence that *Toxoplasma* infection might be a major cause of mental deficiency in view of its known tendency to attack the brain in congenital cases. The incidence of complement-fixing antibodies was less in the hospital patients than in the general population. Among 116 children under the age of 15 with congenital mental deficiency of undetermined aetiology, there was serological evidence of *Toxoplasma* infection, possibly congenital in origin, in 7%. In none of these cases was there clinical confirmation of congenital *Toxoplasma* infection in the form of chorioretinitis or cerebral calcification.

It is concluded that the proportion of congenital mental deficiency in these patients caused by congenital toxoplasmosis was between 0 and 7%, probably nearer the lower figure. The results are discussed and tabulated in terms of age, sex, period in hospital and type of mental disorder. *W. P. Stamm*

HEWSON, G. E. **Toxoplasmic Uveitis in Adults.** *Irish J. Med. Sci.* 1961, July, 6th Ser., No. 427, 323–9. [25 refs.]

"A description is given of suspected toxoplasmic uveitis in four cases of which three may illustrate acquired infection and one may be congenital. Any titre of dye or complement fixation tests may be significant.

"Reference is made to the relative merits of specific and anti-inflammatory therapy in a particular case.

"Thorough clinical examination may fail to reveal an ocular lesion and patients with unsuspected toxoplasmic uveitis may be a reservoir of contagion to others.

"A specific infection may burn itself out after giving rise to an autohypersensitive mechanism which may prolong ocular inflammation."

SIMITSCH, Č. & PETROVITSCH, Z. L'infection éxperimentale du chien avec *Toxoplasma gondii* par voie buccale. [**Experimental Infection of Dogs with *Toxoplasma gondii* by the Oral Route**] *Českoslov. Parasit.* Prague. 1958, v. 5, No. 2, 157–61. [10 refs.]

The authors record the results of inoculation of 27 dogs of various ages with a strain of *Toxoplasma* maintained in sousliks (*Citellus citellus*). From 6·5 to 600 million parasites were introduced directly into the stomach of fasting animals, with the result that only 7 young pups became infected. The infection was in all these cases latent and could only be revealed by subinoculation of sousliks, which are highly susceptible to toxoplasmosis. Since the infectivity of toxoplasms for dogs was also low when inoculated by other routes, it is concluded that dogs play no part in the dissemination of toxoplasmosis among human beings. *C. A. Hoare*

WILDFÜHR, G. Weitere experimentelle Versuche zur Frage der Toxoplasmainfektion und Immunität. [**Further Experimental Investigations on Transmission and Immunity in Toxoplasmosis**] *Českoslov. Parasit.* Prague. 1958, v. 5, No. 2, 187–93.

This paper contains accounts of various experiments on the transmission of and immunity in toxoplasmosis. In one series of experiments "clean" hamsters

were inoculated *per rectum* with the peritoneal exudate from infected mice. They died 6–20 days after inoculation and revealed parasites in the peritoneal exudate and in liver smears, showing that transmission through the rectal mucous membrane took place.

To determine whether toxoplasms were voided in the droppings of infected animals, faecal suspensions from infected hamsters and rats were inoculated into "clean" hamsters. The results of subinoculation showed that hamsters with an acute infection discharged the parasites in their faeces, whereas the droppings of rats with a latent infection failed to infect the experimental animals.

To establish the presence of toxoplasms in the blood of infected animals, hamsters and rats were inoculated by various routes with the peritoneal exudate of infected mice, after which the animals were killed from ½ hour to 9 days after inoculation, and their blood was examined microscopically and subinoculated into "clean" mice. Parasites were detected in the blood of hamsters throughout the infection, and mice became infected both from these animals and from rats.

Various organs of infected hamsters and rats were examined microscopically and saline suspensions of these tissues were inoculated into "clean" mice. The presence of toxoplasms was detected at various periods of time after inoculation in cardiac muscle, lung, liver, spleen, kidney and brain.

Electrophoretic observations of immune rat sera by various methods showed that the total albumin content rose during the first 3 weeks after inoculation of parasites, after which it fell, while the gamma-globulin fraction rose and remained at a high level to the end of the infection, but there was little change in the alpha and beta globulins. It is suggested that the gamma globulin contains a complex of antibodies, including the dye-test antibody. It was also shown that in latent infections of rats treated with non-specific compounds the dye-test titres were affected in different ways, thus "Xifal-Milch" caused no changes, whereas Omnadin produced a diminution. *C. A. Hoare*

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## DERMATOLOGY AND FUNGUS DISEASES

LOEWENTHAL, L. J. A. **The Pathogenesis of Miliaria. The Role of Sodium Chloride.** *Arch. Dermat.* 1961, July, v. 84, No. 1, 2–17, 18 figs. [51 refs.]

Serial sections from punch biopsies from 21 patients with miliaria and 23 controls revealed in early cases changes consisting of intra- and intercellular oedema in the rete malpighii mainly round the epidermal portions of the sweat ducts but without evidence of sweat duct occlusion. It is pointed out that hyperkeratosis and parakeratosis may be the result of intracellular oedema and spongiosis of the rete malpighii, and it is suggested that the classical picture of established miliaria with mechanical blockage and dilatation and rupture of the sweat ducts can be regarded as an inevitable secondary phenomenon. The spongiotic and vesicular changes were considered to resemble those seen in primary irritant eczema and working on this hypothesis the possibility of salt being the primary irritant was investigated.

Test and control lotions were applied in the form of compresses to the skin of 12 subjects. The control lotion consisted of zinc oxide, talc and glycerin and the test lotion was the same with 8% sodium chloride added. 6 of the areas treated with the test solution showed macroscopic changes consisting of a surface irregularity like minute cobblestones. None of the control areas showed macroscopic changes. After 3 to 5 days the histological lesions described in early miliaria were produced in 8 of the test areas and 3 of these 8 to 14 days later showed the classical histological features of established miliaria. Early spongiosis was seen in 4 of the control areas and this was attributed to maceration.

The hypothesis that sensitivity to salt is the primary cause of miliaria is discussed in relation to the physiological changes in acclimatization.

*W. P. Stamm*

DEAN, G. **The Turkish Epidemic of Porphyria.** *South African Med. J.* 1961, June 24, v. 35, No. 25, 509–11, 1 fig.

In 1960 the author visited Turkey to see children affected by the epidemic of porphyria caused by the misuse of seed-wheat for flour and breadmaking, that had been treated with the fungicide hexachlorobenzene and issued for planting [KANTEMIR *et al.*, this *Bulletin*, 1961, v. 58, 130]. It is now estimated by Cihad CAM (who first identified this porphyria) that 5,000 children have serious symptoms; probably thousands more are mildly affected.

Three forms of cutaneous porphyria have previously been described: —

(1) the very rare congenital or erythropoietic porphyria, inherited as a Mendelian recessive character;

(2) porphyria variegata, a Mendelian dominant inheritance found in Afrikaners, and traced to one ancestor who married at the Cape in 1688 (DEAN and BARNES, *Brit. Med. J.*, 1955, v. 2, 89);

(3) porphyria cutanea tarda (synonym: symptomatic cutaneous porphyria, adult chronic porphyria), which is not inherited, occurs sporadically, is often associated with the excessive use of alcohol, and is frequently seen in the Bantu [BARNES, this *Bulletin*, 1956, v. 53, 808].

The Turkish children developed greater pigmentation of the skin and hairiness of the face than occurs in porphyria variegata or in porphyria cutanea tarda of adults; they had enlarged livers, and tests showed marked impairment of liver function. There were large quantities of porphyrin in the urine, but no increase of porphobilinogen, and no increase in faecal porphyrin. The syndrome in the Turkish children was similar to that seen in the sporadic cases of porphyria cutanea tarda in the Bantu of South Africa except that it affects children and not adults, and the symptoms are more severe. The affected children were generally undersized, and had apparently been undernourished before they developed porphyria. Probably this preceding malnutrition—particularly protein deficiency with a resulting poor liver function—accounted for the severity of the symptoms. Children first affected in 1956 still break down with sores during the summer, and it appears that the liver damage is permanent.

This combination of malnutrition with intoxication by a fungicide, which must be used to protect crops for fear of famine, is particularly vicious. In addition

to measures designed to prevent the incorporation of seed-wheat treated with hexachlorobenzene into flour and bread, the author suggests an improvement in the diet of children, now extremely low in protein, by the addition of a suitable protein to wholemeal flour. *T. P. Eddy*

Fuentes, C. A. & Madiedo, O. Breve reporte sobre la epidemiologia de la coccidioidomicosis, histoplasmosis y blastomicosis Norteamericana en Cuba. I. Pruebas cutáneas en los campesinos que vinieron de la provincia de Oriente a la concentración del 26 de Julio del año 1959 en La Habana. **[Observations on the Epidemiology of Coccidioidomycosis, Histoplasmosis and North American Blastomycosis in Cuba. I. Skin Tests on Peasants from Oriente Province]** *Archivos Hospitales Universitarios.* 1960, Nov.–Dec., v. 12, No. 6, 301–6. [17 refs.] English summary (6 lines). II. Pruebas cutáneas en enfermos recluídos en la Colonia Antituberculosa Dr. Louis Ortega Bolaños. **[II. Skin Tests on Patients in a Tuberculosis Sanatorium]** *Ibid.*, 307–15. [13 refs.] English summary (7 lines).

These two papers present the results of a survey for various mycoses by skin tests carried out in Cuba. In both cases the antigens used were histoplasmin, coccidioidin, blastomycin and tuberculin. In the first study, 137 peasants, mainly from Oriente Province, who were lodged in encampments near the University mycological laboratories celebrating "the anniversary of 26th July 1959," were tested. Only 96 could be followed up and the results were:—histoplasmin positive, 15; coccidioidin positive, 1; blastomycin positive, 0; tuberculin positive, 5.

In the second study 118 patients in a tuberculosis sanatorium in Havana were similarly tested with the following results:—histoplasmin positive, 8; coccidioidin positive, 0; blastomycin positive, 20; tuberculin positive, 118. Attempts to recover *Histoplasma capsulatum* and *Blastomyces dermatitidis* from the sputum of some of the histoplasmin and blastomycin reactors were unsuccessful. *Ian G. Murray*

Ramos, C. B. Granulomatose paracoccidióidica. (Observação do seu agente causador, em microscopia de contraste por fase.) **[Observations on the Agent of Paracoccidioidal Granulomatosis with the Phase Contrast Microscope]** *Rev. Assoc. Med. Brasileira.* 1961, Feb., v. 7, No. 1, 22–30, 8 figs. [70 refs.] English summary.

The English summary appended to the paper is as follows:—

"Only by the presence of the etiologic agent in histopathologic preparations could the mycosis be diagnosed.

"Phase microscopy has the property to polarize the light from birefringent subjects. The capsules of the South American Blastomycosis agent have this birefringent property.

"For this reason the phase microscope method would be used for diagnosing this type of fungous disease.

"Under this method the parasites look like bright points, discs or rings, depending on their sizes and position."

[The paper includes good photomicrographs which support the author's conclusions.]

WILSON, A. M. M. **Two Phycomycetes isolated from Subcutaneous Phycomycosis in Uganda.** [Correspondence.] *Nature*. 1961, Aug. 5, v. 191, 612–13.

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## MISCELLANEOUS DISEASES

METZ, J., DANDO, R. & STEVENS, K. **Paroxysmal Nocturnal Haemoglobinuria in a South African Bantu Patient.** *South African Med. J.* 1961, July 8, v. 35, No. 27, 553–4, 1 fig. [10 refs.]

BENNETT, J. H. **Haptoglobin Types in Natives from the Kuru Region and other Parts of Melanesia.** *Brit. Med. J.* 1961, Aug. 12, 428–9.

JELLIFFE, D. B. **Diarrhoeal Disease in Early Childhood in Tropical Regions (Practical Notes).** *J. Trop. Pediatrics*. London. 1961, June, v. 7, No. 1, 29–36. [13 refs.]

This paper is a summary or synopsis of childhood diarrhoea as seen and treated in the tropics, particularly in the less developed areas. It was prepared for the Advisory Committee on Maternal and Child Health, Uganda Medical Service, and presents a short, authoritative summary suited for junior medical personnel and assistants. It is particularly sound on assessment by clinical observation, and treatment under the conditions obtaining in smaller hospitals without elaborate equipment or laboratory facilities.

As a synopsis it does not lend itself to abstracting, but would be most useful reprinted and issued to wards and the like. *A. C. E. Cole*

BLANC, G. Quelques données sur la biologie des maladies infectieuses. [**Observations on the Biology of Infectious Diseases**] *Rev. d'Hyg. et de Méd. Sociale*. Paris. 1961, June, v. 9, No. 4, 283–98, 4 figs.

A historical review with discussion and illustrative data.

CONVIT, J., KERDEL-VEGAS, F. & GORDON, B. **Rhinoscleroma. Review and Presentation of a Case.** *Arch. Dermat.* 1961, July, v. 84, No. 1, 55–62, 6 figs. (1 coloured on pl.). [27 refs.]

MONTGOMERY, R. D. **The Relation of the Treponematoses to Idiopathic Neuropathies in Jamaica.** *West Indian Med. J.* 1960, Dec., v. 9, No. 4, 244–54, 1 fig. on pl. [11 refs.]

A somewhat rare neuropathic syndrome occurring in Jamaica is described, together with some account of 210 cases [this *Bulletin*, 1957, v. 54, 741]; salient features include upper motor neurone paresis and sensory loss of posterior column type with optic atrophy and occasional nerve deafness and peripheral nerve lesions; cerebrospinal fluid is always, and blood often, negative for syphilis but the former usually shows an increased protein (gamma globulin) and a positive colloidal gold curve; age incidence is usually about 40 years, males and females are equally affected and rural dwellers are much more commonly involved than urban ones; the onset is usually slow. Autopsy findings in a few cases showed extensive meningo-vascular changes with chronic arachnoiditis and neuronal degeneration.

Syphilis is common and yaws used to be common in Jamaica but neurosyphilis and congenital syphilis are almost unknown. It seems probable that this syndrome is due to a treponemal variant, probably not venereal, which is a poor stimulus to standard tests but produces an atypical neurological disease; on the other hand nutrition, economic status, personal habits, climate, rainfall and geology of the soil—any or all of these may play a part.

[It would be interesting to know what treatment was given and whether it was effective (*e.g.* penicillin) especially in early cases.] *T. E. Osmond*

SMETANA, H. F., HADLEY, G. G. & SIRSAT, S. M. **Infantile Cirrhosis. An Analytic Review of the Literature and a Report of 50 Cases.** *Pediatrics.* Springfield, Ill. 1961, July, v. 28, No. 1. 107–27, 10 figs. [106 refs.]

JANSEN, F., AMARATUNGE, B. & WILSON, J. R. **A Study of Pulmonary Eosinophilia with special reference to its Treatment.** *Ceylon Med. J.* (n.s.) 1960, Dec., v. 5, No. 4, 167–70. [35 refs.]

Pulmonary eosinophilia is common in Ceylon. The authors have conducted an asthma clinic in the out-patient department of the General Hospital, Colombo, and seen and treated there over 400 patients with pulmonary eosinophilia [in an unstated period].

The clinical picture was that of bronchial asthma: cough and breathlessness, particularly at night, with a little mucoid or mucopurulent sputum; fatigue, but little or no fever; musical rhonchi over all lung fields, with coarse crepitations at the bases. Massive eosinophilia was present, the highest being 97% of 100,400 WBC per cmm. The degree of eosinophilia had little relation to the severity of the symptoms. Radiological changes included the soft miliary mottling characteristic of the condition, but also increased striation, and sometimes soft round shadows up to 1 cm. in diameter.

There was no difference in incidence according to age, sex or occupation; but the disease was much commoner in those living on the coast. There was an increased incidence during the monsoon.

The authors note that the condition responds well both to the organic

arsenicals and to diethylcarbamazine (Hetrazan), this response being an important diagnostic feature. The clinical symptoms respond quickly, some of the radiological signs also disappear after a few days, while the changes in the eosinophil count have been the subject of further study to assess the relative efficacy of the drugs. Relapses are common, occur 6 months to 2 years after cessation of treatment, but respond well to further courses of treatment.

To study the relative effects of the two drugs on the eosinophil counts the authors selected two groups. 130 were treated with diethylcarbamazine (81 with eosinophil counts of more than 50%, and 49 with less than 50%), and 28 were treated with Carbazone (12 with eosinophil counts of more than 50%, and 16 with less). The actual dosage is not stated, but the effect is worked out in terms of increase or decrease of eosinophil count per 100 mgm. of either drug per day. By this method the response to diethylcarbamazine was better than that to the organic arsenical.

The response was less in older than in younger persons. A small series of patients with filariasis did not show any decrease in the eosinophil count under treatment. *A. C. E. Cole*

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## PARASITOLOGY: GENERAL

OKPALA, I. **A Survey of the Incidence of Intestinal Parasites amongst Government Workers in Lagos, Nigeria.** *West African Med. J.* 1961, June, v. 10, (n.s.), No. 3, 148–57, 2 graphs. [21 refs.]

This is a report on the examination of faecal specimens from 515 government workers at Lagos, Nigeria. 91·1% had helminthic infections, and 30·9% protozoal infections. *Ascaris lumbricoides* was the commonest helminth, occurring in 71·5%. Only 2 infections of *Schistosoma mansoni* were found. *Entamoeba histolytica* was found in 10·9%. On average, each person harboured 2·6 different species of parasite. There was no marked difference in the distribution of parasites in the 7 zones of Lagos. The fact of living in a house with a water closet hardly affected the incidence of parasitosis.

Table and bar diagrams give full details. *B. B. Waddy*

MCCULLOUGH, F. & FRIIS-HANSEN, B. **A Parasitological Survey in Three Selected Communities in Luapula Province, Northern Rhodesia.** *Bull. World Health Organization.* Geneva. 1961, v. 24, No. 2, 213–19, 1 map.

The authors present the results of a parasitological survey conducted among children living in three rural and geographically separate communities selected for the work of the Health and Nutrition Scheme, Fort Rosebery, Northern Rhodesia.

The malaria parasite rate in infants in the three areas in October–November 1958 was 18% in Fort Rosebery, 36% in Shikamushile and 73% in Matanda. These differences may be related to anti-malaria operations. The anopheline larvae collected in the pilot areas during the dry season 1958 are listed: there

can be little doubt that *A. gambiae* and *A. funestus* are the most important vectors. Other arthropod parasites recorded were bedbugs, ticks, Tumbu fly and the chigger flea.

Stool and urine examinations were also carried out. Only 3 cases of *Schistosoma mansoni* were found; *Schistosoma haematobium* was much more common and the incidence varied considerably in the three areas. Of schoolchildren weighing more than 20 kgm., 92% were infected in Matanda, 20% in Fort Rosebery and 8% in Shikamushile. The distribution of molluscs, including the potential snail hosts of *Schistosoma* spp. in the pilot areas, is given in a table. The incidence of parasites found as a result of stool examinations are listed: hookworm, *Strongyloides* spp. and *Entamoeba coli* were common; *E. histolytica* and *Ascaris lumbricoides* were rarely found.

The authors conclude that local variation in the prevalence of a particular parasitic infection should encourage rather than discourage the initiation of control measures. *M. J. Colbourne*

Cornejo Donayre, A.· Incidencia de parasitismo intestinal por helmintos y protozoos en el Departamento de Madre de Dios. **[Incidence of Intestinal Helminths and Protozoa in the Department of Madre de Dios, Peru]** Reprinted from *An. Facul. de Med.* Lima. 1959, Dec., v. 42, No. 4, 580–606, 7 graphs & 5 figs. on 2 pls. English summary.

This is a very detailed report of some epidemiological and laboratory investigations made in a small town and a rural area in south-eastern Peru close to the point where the frontiers of Peru, Brazil, and Bolivia meet. The author, who is Assistant Professor in the Department of Tropical Diseases in Lima, states that this is the first investigation of its kind carried out in the rural region and that the whole area is of importance because it is considered to offer great opportunities for settlers from the overpopulated areas of the country.

The climate is hot and humid and except for June, July and August, rainfall is heavy. Many go barefoot, and personal and general hygiene even in the town is unsatisfactory and in the rural area almost non-existent, while a number of the townspeople have the habit of geophagy. It is not surprising therefore that helminth infections are common. The total population of the 2 areas is between 5,000 and 6,000 persons. Faeces from 219 urban dwellers and 299 in the rural area were examined and in addition washings were taken from paper money (5 and 10 sol notes) circulating in the area.

Most of the patients showed evident signs of malnutrition, and the diet was deficient in animal proteins, fats, minerals, and vitamins. The results were as follows:—(a) Protozoa; 1 patient each was found to have *Entamoeba histolytica, Balantidium coli,* and *Giardia,* and a number possessed non-pathogenic protozoa. (b) Helminths; 355 had *Ascaris,* 228 *Ancylostoma* or *Necator* infections, 266 *Trichuris trichiura,* 74 *Strongyloides* and 1 *Hymenolepis nana.* A number had multiple infections. The incidence of *Ascaris* while naturally very high in those aged 1–4 years was also extremely high in persons aged 40 or more. Infections by *Ancylostoma* seemed to be fairly evenly spread in all the age-groups. Ova of *T. trichiura* were found in washings from the paper money. The author tried to get a history of whether footwear was used regularly, occasionally, or not at all and has given the results (which he does not entirely

believe) in a table in which this factor is compared with infections by hookworm. From the table it appears that persons using footwear were more often affected than persons using none at all. *W. K. Dunscombe*

POWELL, S. J., HENNESSY, Esme, WILMOT, A. J. & ELSDON-DEW, R. **The Incidence of Intestinal Parasites in Amebic and Bacillary Dysentery.** *Amer. J. Trop. Med. & Hyg.* 1961, Jan., v. 10, No. 1, 22–4.

The authors, working in the Amoebiasis Research Unit, Durban, investigated the incidence of helminthic infection and of non-amoebic protozoal infection in (1) 100 male Africans with proved acute amoebic dysentery; (2) 50 male Africans with proved bacillary dysentery; (3) a control group of 100 male Africans with miscellaneous non-dysenteric conditions. 5 successive daily stools were examined both by the zinc sulphate flotation technique, to find out minimal infections, and by Beaver's method of counting the eggs in a 1–2 mgm. faecal smear.

Tables are given of the percentage infection with different helminths and protozoa, and the heaviness of infection with the former. The incidence of *Trichuris* (84%) and *Ascaris* (54%) was significantly higher in the patients with amoebic dysentery than in the controls or those with bacillary dysentery. On the other hand the patients with amoebic dysentery had a much lower incidence of other protozoa than the controls.

The authors discuss the significance of these observations and conclude that either *Trichuris* and *Ascaris* have some effect in the initiation of acute amoebic dysentery, or else the helminthiasis and the amoebiasis have a similar epidemiology. *A. C. E. Cole*

MANDOUL, R., DARGELOS, R. & MILLAN, J. Destruction des protozoaires intestinaux de la souris par un dérivé nitré de l'imidazole. **[Lethal Effect of a Nitro Derivative of Imidazole on the Protozoa of the Mouse Intestine]** *Bull. Soc. Path. Exot.* 1961, Jan.–Feb., v. 54, No. 1, 12–16.

It was shown by the authors that trichomycin obtained from a *Streptomyces* was very active against *Chilomastix in vitro* [this *Bulletin*, 1960, v. 57, 597]. Subsequent work has shown that it is inactive *in vivo* against a number of protozoa harboured by mice including *Giardia*, *Trichomonas* and *Entamoeba*, when given orally.

Similar tests were carried out with a nitro-imidazole derivative (metronidazole) [*Bull. Hyg.*, 1961, v. 36, 146 *ter*] and it was found *in vitro* that a concentration of 1/50,000 was lethal to the above three parasites. When given to mice in drinking water at a dosage of about 300 mgm. per kgm., which is far below the toxic dose, for 11 days, it again proved lethal as judged by microscopic examination and culture experiments. The authors note that this substance has already been successfully used in treatment of *Trichomonas* and *Giardia* infections in man [see above, p. 1245] and they foresee its wider employment for treating human intestinal parasites. *J. D. Fulton*

## ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene.]

GOODWIN, W. J. **A List of the Mosquitoes of Libya.** *Mosquito News.* 1961, June, v. 21, No. 2, 106–9, 1 fig.

RAGEAU, J. Intérêt médical des moustiques en Océanie Française. [**Mosquitoes of Medical Interest in French Oceania**] *Bull. Soc. Path. Exot.* 1960, Nov.–Dec., v. 53, No. 6, 1029–42. [Numerous refs.]

ROSAY, Bettina. **Anatomical Indicators for Assessing the Age of Mosquitoes: the Teneral Adult (Diptera: Culicidae).** *Ann. Entom. Soc. of America.* 1961, July, v. 54, No. 4, 526–9, 1 fig. [20 refs.]

JORDAN, Helen B. **The Effects of the Quality of Blood and Temperature on the Production and Viability of Eggs in** *Culex quinquefasciatus. Mosquito News.* 1961, June, v. 21, No. 2, 133–5, 1 fig.

REID, J. A. **The Attraction of Mosquitos by Human or Animal Baits in relation to the Transmission of Disease.** *Bull. Entom. Res.* 1961, Apr., v. 52, Pt. 1, 43–62. [35 refs.]

This paper from Malaya reports the results of field experiments in which the relative attractiveness of human and animal baits to different species of mosquitoes is compared. In addition, a simple formula, or attraction ratio, is put forward as a means of expressing the host preferences of a mosquito as between man and any alternative host. The experiments were carried out in three areas, two of them in tidal mangrove swamp (sites 1 and 2) and the third adjoining freshwater swamp (site 3), each harbouring different vectors of malaria. At each site two large net traps were used simultaneously for trapping the mosquitoes, in one trap the bait being two men and in the other, 20 to 50 yards distant, either one calf or two goats. Mosquitoes were collected from the traps once an hour from 7.00 p.m. to 11.00 p.m. and usually at 5.30 a.m. the next morning. At sites 1 and 2 two series of catches were run, the first comparing two men with one calf, the second comparing two men with two goats. At site 3 only one series was possible, comparing two men and a calf.

The results of this comparative trapping are tabulated and discussed for each site in turn, and, since most species which were common at all three sites, or at two of them, exhibited the same general pattern of attraction, the results are also combined to give a composite picture of the mosquito preferences. The combined results show the ratios of the numbers of mosquitoes caught with human bait to the numbers caught with animal bait. These range from a

man : calf ratio of 3·4 : 1 in the case of the dark-winged form of *Anopheles barbirostris* to one of 1 : 82 for the strongly zoophilous species *A. vagus*. In general the ratios clearly show that the calf was very attractive to most species and that only dark-winged *A. barbirostris*, *Aedes albopictus* and *Culex pipiens fatigans* were more attracted to man. Goats were less attractive than calf, and six species of mosquito were caught in larger numbers with two men than with two goats.

When the mosquitoes were listed according to their man : calf attraction ratios in order of decreasing attraction to man, the vectors of human disease fell more or less together in the range 3·4 : 1 to 1 : 12. However, the actual values of the ratios are considered to be of less significance than the order in which the mosquitoes are aligned. Thus, comparison with published data for Malayan mosquitoes obtained by comparative trapping in which window-trap huts were used [this *Bulletin*, 1952, v. 49, 361] showed that although the values of the ratios obtained with net traps were quite different, the order in which the species were placed was broadly the same.

Against this background of comparative trapping and attraction ratios the Malayan vectors of malaria, filariasis, dengue and Japanese B encephalitis are briefly discussed in turn, and, in general, the vectors are found among the more anthropophilous species. This is least true of the vectors of Japanese B encephalitis, *Culex gelidus* and *C. tritaeniorhynchus*, since this infection is primarily one of animals.

The conversion of comparative trapping results into attraction ratios is then taken a step further and applied to suitable published data from other countries. These data were collected by several trapping methods, but by making corrections where necessary attraction ratios were calculated for a number of species and these are listed in order of decreasing attraction to man. The series of anopheline species ranges from the strongly anthropophilous and very efficient malaria vector *A. funestus*, with a man : cow ratio of 25–52 : 1, to the more zoophilous and much less efficient vector *A. aquasalis*, with a ratio of 1 : 11. In other words the derived ratios place the anophelines in an order that agrees well with their status as vectors of malaria.

The paper concludes with a discussion of some general points which should be considered by investigators engaged on comparative trapping employing man and animal baits, such as the effect of the type of trap and the distance between the traps, and with the suggestion that the use of attraction ratios may provide a method whereby different species in different countries may be compared with regard to their host preferences. *W. W. Macdonald*

GILLETT, J. D. **Cyclical Feeding-Activity in Colonized Mosquitoes.** *Nature*. 1961, June 3, v. 190, 881–3, 2 figs.

An apparatus is described which can be used to measure the amount of food taken by mosquitoes in the laboratory and thus measure any periodicity of feeding during the day and night. The apparatus is a wide feeding tube closed at the lower end by a 0·5 mm.-mesh, non-corrosive, non-absorbent perforated cap and connected above to a narrow transparent measuring tube graduated in mm. (7·0 mm. internal diameter and 300 mm. in length). The apparatus is

filled with the feeding fluid while it is bent into a U-shape and the upper end of the graduated tube is then closed by a screw-clip. The apparatus can then be straightened out into a vertical position on top of a mosquito cage and mosquitoes feed through the mesh cap.

An example is given of periodicity of sugar feeding in *Aedes aegypti* during the day compared with hourly evaporation of sugar solution from a control apparatus.

Laked blood circulated by a heat exchanger coil wrapped around the feeding tube has given the most promising results for blood feeding, although it is necessary to use perforated polyethylene, or metal gauze coated with a fine film of paraffin wax, at the feeding end of the tube.

[See also this *Bulletin*, 1959, v. 56, 1285; 1960, v. 57, 81.] *B. R. Laurence*

ABEDI, Z. H. & BROWN, A. W. A. **Peritrophic Membrane as Vehicle for DDT and DDE Excretion in *Aedes aegypti* Larvae.** *Ann. Entom. Soc. of America.* 1961, July, v. 54, No. 4, 539–42, 2 figs.

SCHMIDT, C. H. & WEIDHAAS, D. E. **The Toxicological Action of Three Organophosphorus Insecticides with Three Species of Mosquito Larvae.** *J. Econom. Entom.* 1961, June, v. 54, No. 3, 583–6.

For several years the authors have been using radioactively labelled insecticides to study the factors involved in the poisoning of mosquito larvae by insecticides [see Schmidt and Weidhaas, this *Bulletin*, 1959, v. 56, 666, and Weidhaas and Schmidt, *ibid.*, 1960, v. 57, 957]. In this present paper, tests with organophosphorus insecticides on larvae of *Anopheles quadrimaculatus*, *Aedes aegypti* and *A. taeniorhynchus* are described. Results show how the actual dose which penetrates is related to time and to the concentration in the suspension. In some cases the relationship is proportional; but often there is a fall off in penetration rate with higher doses or long exposures. Other tests showed differences in rates of excretion of the insecticides. As regards differences in penetration, between one insecticide and another, it has been established that this factor is most important in determining the efficacy of a compound, quite apart from its intrinsic toxicity. When data from all the investigations are summarized for *A. quadrimaculatus*, the results for 24 hours' exposure can be shown as follows:

| Insecticide | LC50 p.p.m. in water | LD50 μgm. per larva | % insecticide taken up from water |
|---|---|---|---|
| Parathion | 0·0060 | 0·00046 | 0·7 |
| DDT | 0·0060 | 0·006 | 10·0 |
| Bayer 22408 | 0·009 | 0·002 | 2·2 |
| Coumaphos | 0·04 | 0·004 | 1·0 |
| Dimethoate | 4·0 | 0·004 | 0·02 |

It will be noted that DDT is readily absorbed from the suspension; whereas dimethoate, though intrinsically as toxic, is not absorbed and is therefore ineffective in practice as a larvicide. *J. R. Busvine*

RIVOSECCHI, L. Contributo alla conoscenza dei Simulidi italiani. I. Reperti in provincia di Latina. [**A Contribution to the Knowledge of Italian Simuliidae. I. The Province of Latina**] *Riv. di Parassit.* Rome. 1961, Mar., v. 22, No. 1, 27–54, 6 figs. [42 refs.] English summary.

This paper gives a detailed account of the distribution of 15 species of *Simulium* inhabiting a series of streams between Rome and Naples, and includes a key to the pupae of the species which the author says can all be recognized at this stage. Of particular interest is the distribution of *S. pontinum* which is found in two areas of sulphurous springs and the larvae and pupae were recovered commonly from water with an $H_2S$ concentration between 0·8 and 3·3 mgm./litre. *B. R. Laurence*

HANSON, W. J. **The Breeding Places of *Phlebotomus* in Panama (Diptera, Psychodidae).** *Ann. Entom. Soc. of America.* 1961, May, v. 54, No. 3, 317–22. [31 refs.]

After reviewing previous records of sandfly breeding places, the author recommends a flotation technique, with saturated sugar solution, for floating out sandfly larvae from soil containing little vegetable material, followed by sieving of the floating material through a series of sieves with 20, 40 and 60 meshes per inch. Breeding material containing much vegetable material is best sieved without the preliminary flotation. Most larvae are retained in the 40- and 60-mesh sieves and this sieved material is first washed in water in 500 cc. cylinders and then the water is replaced by saturated sugar solution. Vegetable material tends to be decanted off with the water and any animals present float at the surface of the sugar solution.

These methods have been used successfully in Panama and 2,219 larvae have been recovered, belonging to at least 15 species. The most profitable habitat for the recovery of sandfly larvae has been the soil in sheltered areas between buttresses at the bases of tropical trees. Most of the 2,123 larvae belonging to 11 species recovered from this type of habitat were found in the top 2 inches of the soil. Other habitats investigated were animal burrows, hollow trees, rock crevices, the forest floor, soil cracks and various sheltered places beneath roots, logs and rocks. The details of these habitats should be consulted in the original paper. *B. R. Laurence*

MACLEOD, J. & DONNELLY, J. **Failure to reduce an Isolated Blowfly Population by the Sterile Males Method.** *Entomologia Exper. et Applicata.* Amsterdam. 1961, v. 4, No. 2, 101–18, 1 fig. [12 refs.]

CLASTRIER, J. & WIRTH, W. W. Notes sur les Cératopogonidés. XIII. Cératopogonidés de la Région éthiopienne. [**Notes on Ceratopogonids. XIII. Ceratopogonids of the Ethiopian Region**] *Arch. Inst. Pasteur d'Algérie.* 1961, June, v. 39, No. 2, 190–240, 32 figs. [25 refs.]

KARDOS, E. H. **Taxonomic Studies on the Larval *Trombicula* (*Neotrombicula*) *nagayoi* Complex of Central Korea (Acarina: Trombiculidae).** *Ann. Entom. Soc. of America.* 1961, July, v. 54, No. 4, 499–508, 22 figs.

## REPORTS AND SURVEYS

LISBON. **Proceedings of the Sixth International Congresses on Tropical Medicine and Malaria, Sept. 5–13, 1958. Vol. III.** *Anais Inst. Med. Trop.* Lisbon. 1959, v. 16, Suppl. No. 7, 831 pp., numerous illustrations. [Numerous refs.]

This volume of the Proceedings of the Lisbon Congresses covers the papers (and some of the discussions) relating to Section 2 (Protozoal Infections) of Division A (Tropical Medicine). Section 2 was divided into Subsection 1 (Trypanosomiasis), Subsection 2 (Amoebiasis) and Subsection 3 (Leishmaniasis), and for each subsection there were at least 3 sessions, several papers being read at each.

The broad subjects included matters as wide as detailed protozoological research, transmission, chemotherapy, and control, and the full text provides a very important survey of many aspects of these diseases. Most of the papers, as usual in conferences of this kind, are themselves summaries of work already known, and it is rarely suitable for a paper containing an account of new, original research to be published in an account of a conference. Nevertheless, as those who were present at Lisbon will know, the stimulus of presentation and discussion of known work is a most valuable part of any meeting, and the present volume is a fitting record of these subjects, beautifully printed and produced, in the various languages in which the papers were read.

For a short notice of volumes I and II see this *Bulletin*, 1961, v. 58, 764; and for a review of the volume containing abstracts of all the papers read at the Congresses see *ibid.*, 1959, v. 56, 249. *Charles Wilcocks*

## BOOK REVIEWS

DE, S. N. [M.B., D.T.M., Ph.D.] **Cholera: Its Pathology and Pathogenesis.** pp. xi+141, illustrated. 1961. Edinburgh 1: Oliver & Boyd Ltd., Tweeddale Court, 14 High Street. London: 39A, Welbeck Street, W.1. [25s.]

In this short book, the author devotes the first two chapters (39 pages) to a concise and fascinating account of the history of the disease. In them he traces the gradual evolution of thought on the causation of cholera from demonic affliction, the influence of the stars on atmospheric conditions and miasma to contagion, and finally to the inspired deductive reasoning of Dr. John Snow who in 1849 noted that the disease was due to a "local affection of the mucous membrane of the alimentary canal" and deduced that it was spread by contaminated water. The isolation of *Vibrio cholerae* by Robert Koch in

Egypt in 1884 and its general recognition as the cause of the disease quickly followed.

The author next describes the classification of the various species of the vibrio, and considers the status of the El Tor and the non-agglutinable (NAG) strains. He concludes that each of the latter is capable of assuming a mildly pathogenic role, but that the resulting disease should not be classified as cholera.

Chapter 2 considers the true geographical origin of the disease. In it the author shows that cholera has been known in India since ancient times but he does not agree that it is essentially an Asian disease, and quotes authorities in support of his contention that the European epidemic of 1854, the Mediterranean epidemic of 1865, those in Jamaica in 1850 and in Guadeloupe in 1865 and also the outbreak among German forces in the Ukraine during World War II were local recrudescences of an endemic though latent disease.

The third chapter describes the epidemiology of cholera in Calcutta, which is shown to be by far the most densely populated city in the world, having 78,867 persons per square mile, compared with 11,566 in London and 25,046 in New York. Ample sources of infection are provided by the raw river water distributed for purely sanitary purposes but often drunk, shallow wells and ponds which are readily infected with flushings from ill-kept bucket latrines and even by the filtered water supply which is subject to contamination by the entry of sewage through defects in the main piping. A map of the city shows that 6 out of its 26 police zones have only surface drains and bucket latrines, while 2 more, at the extreme periphery, have no filtered water supply and no sewers. The reader will agree with the author's observation that Calcutta is a city which has always grown faster than its public services.

Each year in Calcutta the incidence of cholera rises with the increase in the mean atmospheric temperature and humidity between the 15th and 25th weeks of the year but falls abruptly with the onset of the heavy and sustained rains of the south-west monsoon. The widespread occurrence of subclinical infections during the inter-epidemic periods is shown by a considerable incidence of those in whose blood cholera O agglutinin can be demonstrated. This steadily rises throughout January, at the time of the Makar Sankranti bathing festival, and culminates in an epidemic outburst under the favourable climatic conditions which develop in April and May. Moreover, bacteriologically positive cases are to be found in the city throughout the whole year. The author has demonstrated a significant rise in titre to cholera O and H agglutinins within a 7-day period in 52% of patients admitted to hospital with diarrhoea in the epidemic period, even though the organism could not be cultured from their faeces. Though Bengal was probably not an endemic area before the 19th century, the disease has been recorded by European travellers from the 16th to 18th centuries as widely established throughout the rest of India. There can be little doubt that the city of Calcutta now forms the most important endemic focus throughout the sub-continent.

The author, in a clear account of the pathology of the disease, records much original work on the histopathological changes which are found in the suprarenal glands and kidneys. At autopsy the walls of the small intestine feel doughy, being intensely congested and showing marked lymphatic engorgement; the surface epithelium may be completely denuded. Lymphatic hyperplasia and infiltration are marked, especially in children, in whom considerable enlargement of the mesenteric glands may be seen. Though little abnormality may be

seen in sections of the suprarenal glands by conventional staining methods, the author, by the use of special methods, has demonstrated a marked loss of cholesterol, sudanophil granules and of ketosteroids throughout the cortical zone of the gland. The use of Pickworth's stain for vascular tissues has demonstrated very clearly the intense ischaemia of the renal cortex in the fatal case. The tubular segments lying in the cortical zone are equally affected with the glomeruli by this ischaemia. Localized cortical infarcts form, and even total cortical necrosis may be encountered. There is no indication of selective toxic damage to the upper or lower nephron. In post-choleraic uraemia, characteristic ulceration of the colon is often found.

The chapter on the experimental pathology of the disease contains a full account of the author's original methods, including the well-known test for enteropathogenicity by the injection of the test organism into an isolated loop of ileum which is retained within the body cavity of the animal. A more recent technique for the experimental production of cholera in rabbits requires the isolation of the bulky caecum by ligature prior to the injection into the ileum of a suspension of virulent cholera vibrios suspended in 5% mucin. Antecedent steroid treatment facilitated the development of experimental cholera in the animals subjected to this technique, though the continuation of steroids after infection appeared to preserve the life of the animal. Chloramphenicol therapy after infection also appeared to be highly beneficial. It is pointed out that fluid loss and consequent haemoconcentration is far less in degree in the experimentally infected rabbit than in the human patient.

The author has applied the isolated loop of rabbit ileum preparation to the demonstration of activity of filtrates supposed to contain cholera exotoxin and has demonstrated that many such solutions are capable of producing changes identical with those which follow the injection of living cultures of the vibrio. Toxicity is not dependent on mucinase activity, nor on the presence of a lecithinase, though the presence of the latter may be demonstrated by its haemolytic activity on washed human erythrocytes. A highly refined protein substance obtained from living vibrios disintegrated by means of ultrasonic waves proved to have marked hypotensive effects on the circulation of the experimental animal, which were not demonstrable in other filtrates which possessed enterotoxic activity, though the former appeared to exert no enterotoxic action. Professor De concludes that enterotoxic activity depends upon the production of a filterable exotoxin and that an endotoxin contributes to the characteristic circulatory collapse of the disease.

In considering the mode of dissemination of the disease, the author quotes authorities for the statement that the convalescent carrier state may persist for as long as 42 days, and that of the contact carrier for 26 days. He discards the theory that mutation of agglutinable strains into non-agglutinable strains occurs at the end of an epidemic, with their subsequent reversion to agglutinability prior to the next epidemic.

Factors which favour the epidemic spread of cholera during the hot, premonsoon period are increased pollution of water supplies, thirst and perhaps a depression of adrenocortical activity. The swallowing of a large draught of water dilutes the gastric acid barrier and allows the cholera vibrio to pass through it undamaged.

The mechanism of the secretion of large amounts of fluid into the lumen of the gut has long been a matter of controversy. The fact that the cholera stool

contains little albumin has been held to preclude the possibility that the fluid is a transudate from the dilated capillaries, and an excessive production of normal mucosal secretion has been postulated. The author has demonstrated, however, that the contents of the isolated loop of rabbit's ileum, after infection with *V. cholerae*, contain much protein together with Evans blue dye, should the latter be injected into an ear vein, and considers that serum proteins, especially albumin, though they may leak in large quantities from the intestinal capillaries, are thereafter largely reabsorbed through villi which retain an intact epithelium. He has observed that the electrolyte content of the cholera stool closely approximates to that of normal plasma, though chloride appears in part to be retained. He considers that intestinal hypersecretion must play an accessory role in order to produce this differential electrolyte excretion. He states that the apparent acholia of the cholera stool is a pure dilution effect and that no suppression or obstruction to biliary outflow occurs.

In a lucid section on the biochemistry of cholera the author suggests that the characteristic acidosis is due to three factors, namely the high excretion of bicarbonates relative to chloride (though much vomiting will deplete the latter), lowered pulmonary excretion of $CO_2$ due to the slowed circulation rate, and impaired renal excretion of acid radicals. While the serum potassium level is usually lowered as a result of the high intestinal loss of this base, in extreme cellular dehydration it may be washed out of the cells in amounts sufficient to lead to its appearance in an abnormally high concentration in the serum. The author also suggests that the polymorphonuclear leucocytosis, with eosinopenia and lymphopenia, in the absence of suppuration, indicates that adrenocortical activity is stimulated early in the disease, while the depletion in neutral fats, cholesterol and ketosteroids of the suprarenal cortex, which he has demonstrated after death, indicates the subsequent exhaustion of the gland.

The extreme hypotension which is an outstanding feature of the acute disease has long been explained by oligaemia, but the author has demonstrated that, in the cat, a marked fall in blood pressure follows the intravenous injection of cholera endotoxin, but that cholera exotoxin, which appears to be the factor which damages the intestinal wall, has no hypotensive action in the experimental animal. The absorption of a hypotensive factor which is a product of autolysis of *V. cholerae* in the gut thus appears to play an additional role to that of depletion of circulating volume in the production of vascular collapse in this disease.

The author discusses the cause of death in patients who, though they have been treated by adequate fluid replacement from an early stage of their disease, nevertheless die of intractible diarrhoea between the 7th and 10th days. He has shown that in these patients there is a failure of production of O agglutinins and that, in some of them, a haemolytic process has provided a further malevolent factor.

In the closing chapter which is devoted to a discussion on the rationale of treatment, Professor De adds his tribute to the reintroduction by Rogers (1911) of saline infusion which appears first to have been used by O'Shaughnessy as early as 1832. He considers that corticosteroid therapy is of great value, but in view of the depleted state of the suprarenal cortex he suggests that steroids themselves are likely to be more effective than corticotrophin. He holds out hopes that an effective antiserum to the gut-damaging exotoxin may soon be evolved.

The last subject to be discussed is the pathogenesis of postcholeraic uraemia. After recounting the differing explanations of the "obstinacy" of the kidneys, first noted by Lawrie in 1832, the author reiterates his previously expressed view that the sole factor is a shut-down of the cortical arterioles, the entering blood being then diverted through the vasa recta of the medulla, whose walls are devoid of muscular elements. He makes no reference, however, to hydropic degeneration of the renal tubular epithelium attributable to hypokalaemia, the occurrence of which has been stressed in recent papers from Bangkok [this *Bulletin*, 1961, v. 58, 62, 584, 585].

The reviewer has been at pains to write an abstract rather than a brief review of this book because he feels that its authority, clarity and literary quality merit this treatment. It may be summarized as a concise, comprehensive and wholly satisfying description of every aspect of this sombre disease. *J. H. Walters*

FEDOROV, V. H., ROGOZIN, I. I. & FENYUK, B. K. **[The Prophylaxis of Plague]** 230 pp., 26 figs. [In Russian.] 1955. Moscow.

Plague has been established in Russia and Siberia for many centuries, and it is therefore natural that Russian bacteriologists and epidemiologists should have made many major contributions to the study of this disease. The present work deals mostly with the manifestations of plague within the territory of the U.S.S.R. It is divided into 3 lengthy chapters with numerous subdivisions. The first gives an account of the distribution of plague and the natural reservoirs of the infection, and, as may be expected in a Russian publication, is slavishly modelled upon the theory of the natural focal occurrence of infectious diseases propounded by PAVLOVSKI. The main reservoir of the disease consists of various species of murine rodents which are of common occurrence in the areas affected, particularly various types of gerbils, and much attention is devoted to a description of these animals and their habits, and of their significance in the maintenance and spread of plague. The second chapter is devoted to prophylaxis. The measures upon which the most reliance are placed are the systematic destruction of rodents and insects. Live vaccine made from an attenuated strain of *Pasteurella pestis* is also coming into use. The third chapter describes the methods used for containing and clearing up foci of plague infection.

The book provides an informative account of an ever-continuing struggle to eradicate an ancient disease which is being waged on a scale which would only be possible under a totalitarian government. Although many authorities are quoted in the text there are only 14 references, all of which are to publications in Russian. *D. J. Bauer*

HERMS, William B. [Sc.D.]. **Medical Entomology.** Revised by Maurice T. JAMES, Ph.D. 5th Edition. pp. xi + 616, 185 figs. 1961. New York: The Macmillan Co. [87s. 6d.]

This work first appeared as *Medical and Veterinary Entomology* under the authorship of Professor W. B. Herms in 1915 and has appeared in successive editions up to the fourth (in 1950) with a trend towards reducing the veterinary

matter to accommodate the growing subject of medical entomology. It is now revised by Professor M. T. James. Although the veterinary sub-title had been discarded in the third edition [this *Bulletin*, 1940, v. 37, 79], in mites, ticks, oestrid and biting flies there is still enough left in to give the book a wider interest in the veterinary direction which may very well be quite welcome on occasion to medical workers in rural areas.

Professor James has been successful in striking a balance between the older forms of the book and the insertion of new material to bring it more up to date and, notably, accomplishes this in rather fewer pages than formerly. Control aspects and new outlooks in this field, including repellents, account for much of the rearrangement, elimination and substitution in earlier chapters, and in sections in the systematic chapters on different groups which follow. The mathematical approach of MACDONALD [*ibid.*, 1958, v. 55, 229] to the epidemiology of malaria is included succinctly, and arthropod-borne viruses transmitted by mosquitoes and ticks are accorded, as would be necessary today, a fuller presentation. There is considerable revision on house-fly and its allies. The section on tsetse fly is little altered, but useful, more recent, general references (*e.g.*, BUXTON's monograph [*ibid.*, 1955, v. 52, 853]) are now cited. Some pictures, clearly dated by passage of years, have been replaced. Nomenclature is adjusted at many points and there are some new keys. The keys to mosquitoes and midges will interest only American workers, but others of simpler scope—fleas, ticks and mites—are, within their limits, more widely serviceable.

Those who know earlier editions well will recognize that a considerable amount of the text is still exactly as before, although with rearrangement around blocks of new text, and with some parts discarded altogether. The new format provides usefully clearer printing of sectional headings, and bold-face page references in the index now indicate the part of the book in which the subject is most fully treated. Like former editions, this is likely to be a well-thumbed volume in libraries, although it does seem, at £4 7s. 6d., expensive enough for students individually.

One notes several points in need of consideration in further editions which may be contemplated. The important ecological studies in recent years on loiasis have yet to be included; there seems scope for fuller attention to *Mansonia*, and for the association of *Simulium* with crabs. The use of dieldrin against triatomid bugs seems not to be mentioned. *D. S. Bertram*

ZUMPT, F. [Edited by], in collaboration with J. R. AUDY, J. GAUD, R. F. LAWRENCE, G. THEILER, W. M. TILL & G. P. VERCAMMEN-GRANDJEAN. **The Arthropod Parasites of Vertebrates in Africa South of the Sahara (Ethiopian Region). Vol. I. (Chelicerata).** 457 pp., 247 figs. 1961. Johannesburg: South African Institute for Medical Research, P.O. Box 1038, South Africa. [R6.00.]

This substantial compilation on the acarine and pentastomid parasites of African vertebrates is a welcome successor to the earlier check and host list of G. A. H. BEDFORD in 1927, and supplementations to that up to 1936. Like these initial lists, the present work omits parasites of fish. But its scope is greater than Bedford's, not only because of many additions to knowledge over

the intervening years; it extends the geographical range covered from South Africa only to all Africa south of the Sahara. Madagascar, however, is omitted as a distinctive zoogeographical region.

Dr. Zumpt, who edited the entire volume, contributes in collaboration with his colleague Dr. W. M. Till, also of the South African Institute for Medical Research, five of the main sections or chapters. In an introductory discussion on "Arthropod Parasitism and its Evolution" a parasite is defined as "a creature which feeds on the body-substance or the body-contents (ingested food) usually of a much bigger animal (host) without killing it immediately". On this view, the work includes mites which are rather of endoparasitic habit as well as those clearly ectoparasitic, and also the pentastomids. Although the subject matter of the book concerns Acarina and Pentastomida found as parasites on or in mammals, birds, reptiles and amphibia, there is one important omission. The Ixodoidea, or ticks, are discussed briefly, in less than one page, for the reason that Volume II of this series, at present in preparation by Dr. G. Theiler, will be on the ticks of Africa. This subject proved too vast to be included, as originally intended, in the present work.

In a broad discussion by Drs. Zumpt and Till of the evolution of parasitism, the main aspects of parasitism by acarines, pentastomid and also insect orders are reviewed, together with, briefly, concepts of host specificity and modes of transmission by vectors. They give a useful section on collecting and preservation, Berlese's fluid and a methocellulose medium being good mountants for mites. The Institute has adopted clearing of mites in lactophenol, washing in Vitzthum's solution (formula given) and mounting in Berlese's fluid as most satisfactory. Polyvinyl alcohol (PVA) has not been so good as originally expected. Dr. Zumpt, with Dr. Till, then goes on to describe briefly the anatomy in relation to systematics of an acarine, followed by 74 pages on mesostigmatic mites which, for parasitic species in Africa, they recognize 3 families, by far the largest being the Laelaptidae. The 7 subfamilies of this are defined, and a key of 84 couplets given to its many genera, which are selectively illustrated in about 50 line drawings. Laelaptid mites here include species of *Laelaps* (in nests more than on hosts), *Haemolaelaps*, *Macronyssus* (*e.g.*, *M. bacoti*, the tropical rat mite, variously placed in *Liponyssus*, *Bdellonyssus* or *Ornithonyssus* in much literature, introduced to the Ethiopian region and possibly a vector in South Africa of rickettsialpox), *Dermanyssus* (*e.g.*, *D. gallinae*), *Allodermanyssus sanguineus*, and several species of *Pneumonyssus* living in lungs of primates and dassies. Dr. R. F. Lawrence, at Pietermaritzburg, contributes on the order Trombidiformes, presenting in 40 pages with 30 line drawings family and generic keys, records for *Pyemotes ventricosus*, *Demodex* spp. and species of various other genera. Dr. J. Gaud with Dr. W. M. Till, and Dr. Lawrence also, contribute in similar vein on other mange mites (*Sarcoptes*, *Psoroptes*, etc.) and feather mites in the suborder Sarcoptiformes, this latter section having 170 pages and 138 line drawings and several keys to genera. Pentastomids, by Dr. Lawrence, occupy 10 pages and there are several illustrations and a key for the 8 genera. Some 50 pages and just over 20 figures, comprising about 90 separate line drawings, for the Trombiculidae (a family of the suborder Trombidiformes) are the work of J. R. Audy assisted by Drs. Lawrence and Vercammen-Grandjean. A key is given to the 20 genera known from Africa (25 spp. of *Trombicula*). For Africa there is no clear incrimination yet of trombiculids as vectors of disease, nor is scrub-itch

from chiggers known; feeding on man is represented by a sole case of *Ascoschöngastia aethiopica* found on the eyelid of a child in hospital in Uganda, causing little trouble. This section of the book is valuable for its inclusion of many new additions to the faunal list in the past decade or so. A full revision of the family is at present in progress by Vercammen-Grandjean.

The pattern throughout this book is a combination of keys and illustrations to facilitate identifications as far as genus. Thereafter, under species, will be found synonymy with notes on hosts, site of parasitization and locations of collection. There is a concluding host-parasite list arranged by hosts from amphibia to man, including birds; about 180 references; and the formal page index to the parasites themselves. The 247 figures often include several drawings, notably for trombiculids, so that the illustrative aid to recognition is considerable.

*D. S. Bertram*

LAPAGE, Geoffrey [M.A., M.D., M.Sc.]. **Achievement. Some Contributions of Animal Experiment to the Conquest of Disease.** pp. viii+255. 1960. Cambridge: W. Heffer & Sons Ltd. [18s.]

This book describes the nature of experiments done on man and animals, in a style and language suitable for the non-specialist or layman. Two broad classes of experiments are considered: physiological and pathological—the latter dealing mainly with infective processes and immunity. These are the stated simple aims, but the medical or veterinary research worker will find much to interest him, because the broad principles of scientific investigation are inevitably discussed, and a novel view of the subject is disclosed.

Experiments done on man are discussed in a special chapter, and for the benefit of "antivivisectionists" it is important to point out that many vital discoveries have been made first by human experiments, often on the investigator himself and sometimes, as is well known, with fatal results. Neither the ethics of this type of research, nor of the use of animals are considered; the author thinks that this is a question which the reader must decide for himself. Nevertheless it is an omission which he might rectify in a future edition or new book, because, undoubtedly, principles exist which can be stated, and which in fact have been laid down in ethical codes.

About a third of the book is devoted to infectious diseases, and a short description of each disease precedes the account of the researches involving the use of animals in elucidating its nature and method of control, while later chapters consider chemotherapy, surgery, nutrition and other specific subjects.

There are two useful appendices: the first describes the legal position in regard to experiments on vertebrates in different countries, of which Britain is the first and leading exponent. Elsewhere there is a wide variation of legal control, from Liechtenstein, which prohibits all experiments, to many countries (including France, Spain, India, Canada, Egypt, Japan, Latin America and the U.S.S.R.) where there is no law relating to such experiments. The second appendix gives a short account of the breeding and care of laboratory animals, useful more for general principles and references than for actual detail.

*P. C. C. Garnham*

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